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BLUE SHIELD PARTICIPATION AND MEDICARE ASSIGNMENT IN PENNSYLVANIA

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BLUE SHIELD PARTICIPATION AND MEDICARE ASSIGNMENT IN PENNSYLVANIA

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Opinions expressed are those of the author and, unless specifically stated otherwise, do not necessarily reflect official or unofficial positions of Pennsylvania Blue Shield.

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I. INTRODUCTION

To assure more effective coverage and service for their insured populations, while simultaneously pursuing price control and cost containment objectives, health insurance programs sometimes will attempt to secure the cooperation of health care providers. Typically, these cooperative arrangements seek to assure that the provider will accept the insurer's (or program's) fee allowance, and that the insured patient will be assisted in the claims submission process. As a quid pro quo, the insurer agrees to make payment of the allowed amount for the service directly to the provider, thereby relieving the provider of risks otherwise attendant to the fee collection process. For Blue Shield Plans, such an arrangement is referred to as physician participation. In the Medicare Part B program, the physician entering into such an arrangement is said to "accept assignment."

The central policy objectives, issues and implications surrounding such arrangements are more-or-less immediately obvious. Medicare seeks to realize the greatest possible rate of assignment acceptance, and Blue Shield wants to have as many participating physicians as possible. If participation and assignment rates are high, the insurance program's health care cost containment objectives will be more effectively satisfied. Concomitantly, the insured population will incur less out-of-pocket cost, since the participating or assignment-taking physician generally is required to accept the insurer's fee allowance as payment in full. When participation and assignment rates are lower, health care costs are less controlled, at least in the effective short term.

Controlled health care costs and smaller out-of-pocket expenses clearly are valuable payoffs for the health care consumer.

Further, the insured health care consumer may find that some assistance with the claims submission process is an almost equally valuable payoff. Policies and procedures for completing and submitting health insurance claims are frequently very complicated and difficult from the layman's point of view. A participating or assigning physician is expected to handle all of the necessary insurance paperwork for the insured patient, seeing to it that a claim form is properly completed and properly submitted, accompanied by any required supporting documentation. Not only is the insured patient relieved of this initial administrative burden; he/she may be somewhat better assured that the paperwork has been done correctly, and that the claim therefore will be processed more accurately and more quickly. This is a positive result for the entire system, as well as a valuable service to the individual insured consumer.

In general, however, the Medicare Program has not enjoyed particularly impressive rates of assignment acceptance by physicians. The Health Care Financing Administration (HCFA) has faced a major challenge in attempting to understand the factors influencing physicians' assignment acceptance decisions, and in acquiring knowledge and insights to help define policy directions through which rates of assignment acceptance might be increased. Similarly, Blue Shield Plans have not on the whole been satisfied with their physician participation rates; and in general there also is very little understanding of the factors related to physicians' Blue Shield participation decisions. This report describes and presents findings from a study which was conducted to identify and

obtain better understanding of the factors influencing these participation and assignment decisions among Pennsylvania physicians.

A. PENNSYLVANIA BLUE SHIELD REIMBURSEMENT SYSTEMS

Pennsylvania Blue Shield (PBS) offers two main kinds of benefit plans, each with its own distinctive approach to determining amounts to be allowed as reimbursement for reported services. These two main benefit plans and reimbursement schemes will be described briefly here, and discussed in relation to implications for the participating physician.

The most commonly held plan at PBS is the UCR Plan. This plan provides a relatively generous schedule of benefits. It features a reimbursement methodology originally designed with the intent of closely reflecting and following "going rates" in the medical marketplace in the determination of fee allowance limitations. For present purposes, this system will be described only in its broadest outlines. Essentially, it seeks to limit a physician's reimbursement for a given service to an amount that is determined to be usual, customary, and reasonable for the given service when provided by the given physician.

For each individual physician, a file is developed of his "usual" fees for each specific procedure he reports frequently enough to assure statistical validity. The usual fee for a given procedure for a given doctor is defined as the median value of the distribution of charges he has reported on claims for that procedure during the preceding year.

In addition, each physician is assigned to a peer group defined in such a way as to reflect similarities of professional training and

experience, and also to reflect similarities in economic characteristics of practice locale. The training and experience factors are taken into account by recognizing the physician's self-designated specialty of practice. To recognize differences in the medical market characteristics of different practice locales, the state has been geographically partitioned into four "charge class" areas. In general, the charge classes tend to reflect four different intervals on an urban-rural continuum, with corresponding degrees of variation in socioeconomic level. The "customary" charge screen for a given procedure for a peer group is defined to be the value found at the 90th percentile of the (weighted) distribution of usual charges for all physicians belonging to that peer group.

In the claims adjudication process, the "reasonable" fee allowance is determined as the smallest of: (1) the actual reported charge on the claim for the procedure; (2) the individual physician's usual charge for the reported procedure; or (3) the customary charge on file for the physician's peer group. A greater amount will be allowed only if it can be ascertained that there were unusal or extenuating circumstances in the delivery of the services, in which case an appropriate "reasonable" allowance amount is determined by special review. Both "usual" and "customary" charges are periodically updated.

A participating physician must accept the UCR allowance as payment in full for all covered services delivered to patients holding PBS UCR coverage. In addition, as indicated earlier, the claims paperwork is to be completed and submitted by the physician's own office staff. Payment on the claim is made directly to the physician.

PBS also offers two different fee schedule plans. For present purposes, they will be discussed as a single entity, since they are structurally similar from the standpoint of reimbursement methodology. The fee schedule plans have a fixed table of allowances applicable to all doctors statewide. In the claims adjudication process, the allowed fee is determined as the lesser of the actual reported charge on the claim, or the scheduled fee allowance for the reported procedure. In general, the fee schedule plans provide smaller payment allowances than the UCR Plan.

The fee schedule plans also are set up to operate as Service Benefit plans. This means that for covered patients with annual income below certain specified levels, the participating physician must accept the fee schedule allowance as payment in full (thus providing a "service benefit," as opposed to a simple indemnity). For patients with fee schedule coverage who have annual incomes greater than the threshold established for the service benefit means test, the physician -- whether participating or not -- has no obligation to accept the fee shedule allowance as full payment. In any event, however, the participating physician still is expected to have his office staff do the claims paperwork.

The participating doctor agreement at PBS is an all-or-nothing arrangement. The doctor either participates for <u>all</u> Blue Shield business that comes to him, or he doesn't participate at all. Participation cannot take place on a claim-by-claim basis. The participating physician is required to sign a contractually binding agreement.

B. MEDICARE REIMBURSEMENT AND ASSIGNMENT

The Medicare Part B reimbursement system operates essentially like the PBS UCR system described above. The basic mechanics are the same, but the terminology and some of the system parameters are different.

In the Medicare system, there is for each individual physician a file of his "customary" charges for each specific procedure he reports often enough to assure statistical validity. The Medicare "customary" is analogous to the Blue Shield "usual," and is similarly defined as the median value of the distribution of actual charges reported on claims during the preceding year.

The Medicare system at PBS also employs the same peer group structure and peer group definitions as are used in the PBS private UCR system. Peer group "prevailing" charge screens are determined, analogous to the "customary" charge screens in the PBS UCR system. The Medicare "prevailing" charge screen, however, is calculated at the 75th percentile of the (weighted) distribution of customary charges for all physicians in the peer group -- as opposed to the 90th percentile parameter used in the PBS UCR system. In addition, since 1976, Medicare prevailing charges have been still further constrained by a mandated economic index designed to reflect practice costs and general earning levels.

In claims adjudication, the "reasonable" fee allowance is determined as the smallest of: (1) the actual reported charge on the claim for the procedure; (2) the individual physician's customary charge for the reported procedure; or (3) the prevailing fee on file for the physician's peer group. Again as in the PBS UCR system, a greater amount can be

allowed after special review only in the event of unusual or extenuating clinical circumstances. Medicare customary and prevailing charges are periodically updated.

The amount paid by the Medicare program is 80 percent of the allowable amount for the service, with the beneficiary responsible for a 20 percent cost share. There also is a modest initial deductible each year.

The physician is allowed to take assignment on a claim-by-claim basis. If he takes assignment, he must accept the allowed fee as payment in full for the services covered by that claim. The 80 percent payment is sent directly to the physician, and it is his responsibiliy to collect the 20 percent cost sharing amount from the beneficiary. He cannot, however, collect anything additional from the beneficiary beyond the beneficiary's legally mandated 20 percent share of the allowed charge. The physician also is responsible for the beneficiary's claims paperwork on an assigned claim.

If the physician does not take assignment on a claim, the beneficiary is responsible for his own claims paperwork (although many doctors will do this for Medicare beneficiaries, even though not required to). A payment in the amount of 80 percent of the allowed fee is mailed directly to the beneficiary. The physician is responsible for collecting from the beneficiary, and may attempt to collect any amount he thinks his service is worth. He is not constrained by the "allowed" amount, but may or may not in fact succeed in collecting his fee.

C. SUMMARY OF FINDINGS

A descriptive and analytic approach is taken to seek out empirical patterns of Blue Shield participation and Medicare assignment, to identify and explore factors related to physicians' participation and assignment decisions, and to differentiate the characteristics of those who do and do not participate and take assignment. Beyond the purely descriptive elements, the basic approach is an analysis of variance.

It is found that on average Pennsylvania physicians take assignment on 37.7 percent of their Medicare line items and 45.1 percent of their billed charges under the Medicare program. The distribution of physicians with respect to Medicare assignment rates is generally U-shaped, indicating a tendency toward a bipolar response pattern. Most physicians either consistently accept or consistently decline assignment. Specifically, 14.0 percent consistently (on at least 90 percent of line items) accept assignment, and 40.2 percent consistently (on 10 percent or less of line items) decline assignment.

For Blue Shield programs, it was found that 87.5 percent of physicians participate with Blue Shield. Although this rate is a bit higher than indicated by PBS company sources, the difference can easily be reconciled, and 87.5 percent probably is a reasonably reliable estimate of the participation rate for physicians submitting Blue Shield claims with some regularity.

In a more detailed examination of Medicare assignment behavior, it was found that there is considerable variation by specialty. Specialists tend to have higher assignment rates than generalists, with medical and

surgical specialists having assignment rates slightly greater than 42 percent, and generalists having an average assignment rate of 27.5 percent.

Board certified physicians have higher average assignment rates than those without such credentials, with 42.0 percent and 34.7 percent, respectively. FMG physicians on the average take assignment on 55.5 percent of their line items, which is much higher than the average for all others. It also is found that older physicians have lower assignment rates, while younger physicians have higher rates. Those in the youngest age decile take assignment on 58.0 percent of line items, and those in the oldest decile assign 22.0 percent.

It is conjectured that physicians' Medicare assignment rates may be determined to some extent by the characteristics of their practices with Medicare patients. Among the factors examined, the most important were found to be the mean annual billing per Medicare patient, total annual Medicare billings, mean charge per Medicare service, and number of different Medicare patients seen in a year. High Medicare assignment rates are associated with higher values on all of these factors. Similar and analogous relationships hold with regard to the physician's overall practice.

Twenty-five different factors are examined as key characteristics to describe the physician's practice locale. These are organized into three main subgroups: (1) general demographic and socioeconomic factors; (2) factors describing the local medical services economy; and (3) factors serving as indicators of health insurance and medical subsidization. Some of the more important factors from the first subgroup were found to be

population density, unemployment rate, and liberal-conservative political orientation. In the second group, hospital bed supply and primary care physician supply were important. From the third group, it became apparent that money entering the local medical services economy from insurance and government medical programs contributes to higher assignment rates.

In the case of Blue Shield participation, many of the Medicare assignment findings were reversed. Specialists were found to have lower participation than generalists. General practice physicians showed a 92.6 percent participation rate, while surgical specialists were low with 81.9 percent. The Medicare trends also were reversed for board certification and physician's age. Board certified physicians had an 83.4 percent participation rate, while those not board certified were higher, at 90.5 percent. Older physicians tended to have greater participation rates, with the oldest decile at 89.3 percent and the youngest at 85.7 percent. By source of medical education, FMGs had the highest participation rate, paralleling the Medicare findings in this instance.

The findings with respect to practice characteristics also were, in general, reversed from the findings for Medicare assignment. The effects of practice locality characteristics, on the other hand, were similar to the findings for Medicare. It was noted, however, that all of the effects pertaining to Blue Shield participation were much weaker than the effects observed for Medicare assignment.

On the whole, it is felt that Medicare assignment is reasonably rationally explained, but Blue Shield participation is much more difficult to understand and explain.

D. OUTLINE OF REPORT

This introductory chapter has defined the subject matter and motivation for the study, and has given an introduction to Blue Shield and Medicare reimbursement systems, including definitions of participation and assignment. Section II, which follows immediately, provides a review of previous work and an outline of the approach being taken for this study. Section III describes the study data base and sets of variables used for the study. Sections IV and V present detailed findings for Medicare assignment and Blue Shield participation, respectively. Section VI, finally, provides a summary discussion of the findings.

II. CONCEPTUAL AND ANALYTICAL FRAMEWORK

A. PREVIOUS STUDIES OF ASSIGNMENT AND PARTICIPATION

Significant previous research in the area of Medicare Part B assignment has been done by Huang and Koropecky (1973), Ferry et al. (1980), Paringer (1980), and Mitchell and Cromwell (1981). The latter, by Mitchell and Cromwell, is based primarily upon relatively recent national survey data, and must be recognized as the most comprehensive and definitive treatment of this subject to date. In additon, Sloan, Mitchell, and Cromwell (1978) have examined issues and factors related to physician participation in state Medicaid programs. Even though the Medicaid program and its market are substantially different in many ways from either Medicare or Blue Shield, results from this work still may have some applicability to related issues in Medicare assignment and Blue Shield participation. This work was further extended by Mitchell, Cromwell, and Schurman (1981) for an analysis of the joint Medicare-Medicaid participation decision. Previous research on Blue Shield participation is very scant. Sloan and Steinwald (1978), using 1973 data on a national sample of physicians, examined the motivations for, and the determinants of, physicians' decisions to participate in Blue Shield. Yett et al. (1981) reported a study of factors related to the participation decision, based upon data from two Blue Shield Plans. Previous work on participation and assignment in health insurance programs has been both theoretical and empirical.

1. Conceptual Model of Market

Most of the work cited above has been based upon a theoretical framework which views the physician as a profit maximizer operating against two or more different markets. For simplicity and expediency, this expository review will be framed in terms of a two-market situation. The extension to more than two markets is conceptually straightforward.

The first market is a private uninsured or nonparticipating market, in which the physician acts as a price-setter with a traditionally downward-sloping demand curve and marginal revenue curve. The second is a market for participating and/or assigned services, in which he is (either in fact or in effect) confronted with a fixed (at least in the short run) schedule of fee allowances for his services. In this second market, he acts as a price-taker operating against a horizontal marginal revenue curve, at least until his demand here is effectively exhausted. The model in general assumes a single cost function for his activity in either or both markets.

With this conceptual framework, rational economic behavior dictates that the physician will first exhibit a preference for the private, nonparticipating, and/or unassigned market. He will continue to have a preference for this market, and will operate solely or predominantly in this market, until its downward-sloping marginal revenue curve intersects the horizontal marginal revenue curve of the second market. At this point, he will shift his preference to the second market, since for any demand beyond this point the marginal revenue curve for the second market dominates that of the first. If the physician has any remaining capacity after demand in the second market has been effectively

exhausted, he will immediately drop vertically to operate again on the downward-sloping marginal revenue curve for whatever profitable portion of the first market may remain. (In the event that more than two markets are postulated, he will move to whichever is the most profitable remaining market.)

For a more extensive and detailed discussion of this analytical framework as it would be applied to a multiple-market situation, see Mitchell, Cromwell, and Schurman (1981). An application of the model specifically to the Medicare market is detailed extensively in Mitchell and Cromwell (1981). A somewhat briefer, but still relatively complete, exposition of this conceptualization as it may be applied to Medicare can be found in Paringer (1980).

2. Implications and Expected Results from Theory

On the basis of the theoretical construct described above, one can predict a number of effects to be anticipated for physician response to the assignment/participation decision in such a market. The following is a summary of some of the salient implications.

An effect of major importance in this conceptual model is that any increase in fee allowances for a program in the assigned/participating market will yield increased rates of assignment acceptance and program participation. This follows since an increase in fee allowances is tantamount to an upward shift in the horizontal marginal revenue curve for the second (assigned/participating) market. The upward shift in the marginal revenue function raises the price level, and correspondingly reduces the quantity threshold, at which the physician will find it

attractive to depart from the downward-sloping marginal revenue curve of the relatively freer first market.

Corollary to this, it also follows that an increase in the severity of cut-backs from billed to allowed charges should reduce the rates of assignment acceptance and participation. A negative response to fee cut-backs also is intuitively foreseeable as a psychologically motivated response on the part of physicians.

To the extent that more stringent and demanding administrative practices and compliance requirements may increase operating costs for program participants, such policies would tend to contribute to an upward shift in the participating physician's marginal cost function -- and hence would provide incentives to reduce the extent of participation in both markets. In practical terms, this effect would impact most essentially upon the assigned/participating market. Again, more stringent administrative requirements intuitively may be assumed to provide psychological -- as well as economic -- disincentives to assignment and/or participation.

Any other factor contributing to higher practice costs -- such as, for instance, office wages -- similarly may be expected to be associated with reduced assignment/participation.

If it can be assumed that a physician's skills tend to deteriorate with advancing age, then the physician's age could be perceived by consumers as a quality-of-service factor which would tend to reduce the demand for the services of older physicians. As the demand curve shifts inward, this theoretically should diminish the size of the unassigned/nonparticipating market available to the older physician, and

hence would induce him toward heavier participation in the assigned/participating market. This assumption has in fact been made in some of the prior studies cited earlier. The theoretical relationship between physician age (or years of experience) and the physician's market behavior with respect to the assignment/participation decision nevertheless remains somewhat ambiguous.

Other factors presumed to be related to the quality of a physician's services, and hence commonly used as proxies for quality, are specialty status, board certification, and identification as a foreign medical graduate (FMG). Specialty status and board certification would be presumed to be indicators of greater quality, and thus would increase the overall demand for a physician's services and reduce his participation in the assigned/participating market. FMGs are generally regarded as being inferior, providing lower quality services, and hence may be expected to be less in demand and to show greater assignment/participation rates.

Among other demand variables commonly found (or conjectured) to have an important influence on the markets for physicians' services, a higher physician-to-population ratio should be expected to reduce the free market demand for individual physicians' services. If the physician's opportunity to participate in the unassigned/nonparticipating (i.e., "free") market is thus diminished, he may be expected to show a heightened interest in the assigned/participating market. Greater supplies of physicians relative to a market area's population base therefore may be anticipated to be associated with higher rates of assignment and participation. Higher patient (or population) income conversely may be expected to increase free market demand for services, and consequently may

induce smaller assignment/participation rates. It also has been hypothesized that greater amounts of more generous private insurance in a market area should tend to reduce the attractiveness of publicly-funded assigned/participating markets for most physicians.

3. Alternative Market Model for Blue Shield Participation

In addressing the question of a theoretical framework for analyzing physicians' Blue Shield participation decisions, Yett et al. (1981) take the position that a discrete optimization model is more appropriate than the multiple-market model described above. In this model, the physician is assumed to be faced with a discrete market choice between participating or not participating (as opposed to the continuous, or claim-by-claim, decision process which may be implied by the other model), and is assumed to make the choice which will maximize profit.

The implications of the discrete model are much less clear than those of the multiple-market model. While some of the effects summarized above for the multiple-market model still may be expected, others cannot. In general, theoretical outcomes arising from outward shifts in the demand function in the nonparticipating submarket, or from upward shifts in marginal cost for both submarkets, will be indeterminate. The upshot is a greater dependency on empirical determination of outcomes that may be associated with given changes or parameter variations in the market.

4. Empirical Results and Findings from Previous Studies

In a collective overview of the studies cited above, it may be noted that nearly all of these studies included a test of the relationship

of fee allowance levels to assignment/participation rates. As expected, assignment/participation rates were uniformly found to increase with more generous fee allowances for programs operating in the assigned/participating market. The effect, moreover, was generally found to be of a substantial magnitude, with fee allowance levels frequently emerging as a dominant factor. This apparent high level of concern focusing upon fee allowance levels in the physician's assignment/participation decision process also is consistent with the findings of a recent in-house study of physician participation conducted by Pennsylvania Blue Shield (1981). In focus group interviews with four different panels of ten physicians each, as well as in a carefully designed mail questionnaire survey among a stratified sample of 1,304 Pennsylvania physicians, dissatisfaction with fee allowances emerged as the dominant theme associated with nonparticipation.

Paringer (1980) found Medicare assignment acceptance to decrease in response to higher private price levels for a physician; and Yett et al. (1981) similarly found lower rates of Blue Shield participation for physicians with higher prices.

Supporting a corollary expectation arising from the price and allowed charge phenomena reported above, Mitchell and Cromwell (1981) found Medicare assignment rates to decrease as the relative cut-back from billed to allowed charge grew larger. Paringer, on somewhat weaker evidence, speculates on the same effect. In popular intuition, the existence of any significant gaps between billed and allowed charges has long been suspected of being an important contributory factor in many physicians' decisions not to accept Medicare assignment or not to

participate in Blue Shield.

Quality factors on the whole behaved as predicted. Better credentials, as reflected by specialty practice and board certification, tended to be associated with lower assignment/participation rates. In addition, nearly all of the cited studies included an examination of the effects of FMG status; and they uniformly found FMGs to have higher assignment/participation rates.

The effect of office wages as a cost factor was mixed. Mitchell and Cromwell found the office wage factor to be significant, but in the opposite direction from that predicted by theory. Yett found the observed effects of the office wage factor to be inconclusive.

The effects of population (or patient) income were exactly and uniformly as predicted. Higher income levels in the patient population base were found to be associated with lower rates of assignment and participation.

The physician-to-population ratio had effects that were mixed, inconclusive, and often contrary to theory. Huang and Koropecky (1973) found mixed effects here. The studies by Mitchell and Cromwell (1981) and by Sloan, Mitchell, and Cromwell (1978) showed results that were in the wrong direction from that predicted by theory -- i.e., the results showed assignment/participation rates decreasing with increasing physician-to-population ratios. The results of Sloan and Steinwald (1978) were in the theoretically correct direction, but were not significant. Yett's results were mixed, and in some cases not significant. It has been speculated that the empirical observation of assignment and participation rates decreasing as physician-population ratios increase could be evidence

of physician-induced demand.

Finally, political conservatism was found by Mitchell and Cromwell to be associated with lower Medicare assignment rates, as many have hypothesized.

B. SCOPE AND ANALYTICAL APPROACH FOR PRESENT STUDY

The bulk of the preceding work, as cited and summarized above, has tended to employ the models, methods, and perspectives of a strict econometric approach. The present study and results reported here tend to be more essentially descriptive. Analytic aspects of this work are directed toward a systematic isolation and examination of the salient factors appearing to influence, or to be associated with, physician assignment and participation in health insurance programs. Beyond its purely descriptive elements, this study seeks first of identify -- from a very large set of potentially related variables -- those variables most significantly related to physician assignment acceptance under Medicare and physician participation in Blue Shield. This includes a determination of the basic nature of the observed effects -- i.e., the direction in which each effect is seen to operate, and at least a rough indication of the relative strength or impact of the various significantly influential factors.

Perhaps the most fundamental difference between this work and any of the work reported earlier (as cited above) is that this work takes a much less purely economic perspective on the subject matter. The underlying viewpoint or philosophy is that the phenomena surrounding physician

assignment and participation in health insurance programs are not necessarily purely economic, and that it may be possible to obtain some useful new or extended insights by departing from the strict confines of a conceptual framework based upon tightly defined econometric models and economically motivated a priori conceptualizations. The approach taken is basically a heuristic discovery process. There is no intent or design to achieve precise estimation of the parameters of a specified economic model.

Another vital and positive difference in this study is its use of a data base that, although limited to Pennsylvania physicians, is in every other respect the most extensive and richest data set yet brought to bear on any of these problems. In large measure, in fact, it is the very size of the available data resources that dictates a somewhat different viewpoint in conceiving an approach to the study. Beginning with an extraordinarily large data set, a greater than usual emphasis and share of the effort must be focused upon simply achieving an orderly, systematic, and constructively directed reduction of variables. The study data base and variables are described later, in Section III.

Methods employed in reducing the set of variables to a manageable size, while isolating and examining those factors appearing to be most importantly related to physician assignment and participation, included correlation analysis, factor analysis, and analysis of variance (ANOVA). The correlation and factor analysis phases of the work primarily served the purpose of providing preliminary insights into the general structure of the data set, identifying patterns of relationship and interdependence between the several variables in the beginning data set. The

substantially reduced data set emerging from this phase of analysis then was subjected to a more detailed and critical analysis through an extensive series of one-way ANOVA. The ANOVA results comprise the principal findings from the study.

III. DATA BASE

This study was conducted as an ancillary effort embedded in a larger study of the pricing practices of Pennsylvania physicians. For the study of Pennsylvania physicians' pricing practices, and of factors related to their pricing behavior -- as well as for this companion study of their behavior relative to Medicare assignment and Blue Shield participation -- an extensive data base has been compiled to provide detailed information on the prices and quantities of services delivered by physicians in this state. Data have been collected and retained at the level of the individual physician for more than 11,000 Pennsylvania physicians. These price and quantity data have been extracted from claims transaction files created in connection with claims processing operations at Pennsylania Blue Shield covering both the Medicare Part B and private Blue Shield programs. The study focuses upon forty-six representative, well-defined, and frequently performed procedures, in a 1975 time frame. Physicians represented in the data base are all those who reported claims within a given line of business (i.e., Medicare or Blue Shield) for at least ten services for any of the forty-six criterion procedures during the year 1975.

To support the study of factors related to observed pricing practices, a matched data base of individual physician characteristics also has been developed. Drawing upon American Medical Associaton (AMA) and American Osteopathic Association (AOA) reference sources, as well as upon various in-house PBS files, nearly 10,000 physicians from the price and quantity data file were matched to produce an extensive and detailed

composite physician characteristics file.

In addition, a file was developed containing some sixty-four variables to describe each of Pennsylvania's sixty-seven counties. The information in the county data file was attached to the physician characteristics file by virtue of knowledge of the county in which each physician practices. These county level data were used as the best available information to characterize each physician's practice locale.

Since PBS private Blue Shield and Medicare claims experience files provided one of the primary sources from which this data base was developed, it should be noted that claims data bases are notorious for the inaccurate and spurious data they contain. These source data problems arise from a variety of causes -- e.g., miscoding, erroneous reporting, data entry errors, supplemental claims relating to old claims appearing as new claims, and others. Meticulous data quality control procedures were employed in the development of the data base for this project to assure that incorrect, spurious, and invalid data have been (to the greatest extent possible) detected and filtered out.

A. DATA BASE FOR STUDY OF ASSIGNMENT AND PARTICIPATION

This study of Medicare assignment and Blue Shield participation thus is based upon an extensive and carefully quality-controlled data base for the time frame 1975. The data set contains approximately 150 data items for each of 9,827 Pennsylvania physicians, spanning personal physician characteristics, practice characteristics, and characteristics of practice locale for each individual physician. Of the 9,827 physicians represented

in the data base, 8,322 (84.7%) are represented for private Blue Shield experience; 9,102 (92.6%) have Medicare experience; and 7,597 (77.3%) have experience in both lines of business.

Doctors of Medicine (M.D.) comprise 88.7 percent of the sample; Doctors of Osteopathy (D.O.) comprise the remaining 11.3 percent.

A breakdown by specialty shows (for some illustrative major specialties) 2,547 (25.9%) in general practice, 823 (8.4%) in family practice, 935 (9.5%) in general surgery, 646 (6.4%) in obstetrics-gynecology, and 1,414 (14.4%) in internal medicine. These are self-designated specialties. In broad summary, the physician sample consists of 34.4 percent in general or family practice, 27.8 percent in medical specialties, 32.5 percent in surgical specialties, and 5.4 percent in other specialties (anesthesiology, radiology, pathology, etc.).

Board certification credentials are held by 42.3 percent. National professional association (AMA or AOA) membership is held by 77.3 percent. Professional schools within the state of Pennsylania produced 68.4 percent of the physicians in the sample; 21.5 percent are from other medical schools throughout the United States; and 10.1 percent are foreign medical graduates (FMGs).

To the extent that master listings were available to facilitate checking of these sample distributions, it can be said that the distributions for all stratifications in the sample are highly representative of the actual stratification reflected in the PBS physician masterfile and other authoritative sources.

B. REDUCED VARIABLE LIST FOR ANALYSIS OF VARIANCE

The complete original variable list in the data set for each physician contained a great many variables which ultimately turned out to have little or questionable significance, or which accounted for negligible proportions of the variance in the response variables. In addition, the full starting set of variables contained a number of subsets of deliberately redundant variables -- i.e., different variables to measure more-or-less the same thing. For example, mean family income, median family income, and per capita income all were included as available alternative population income measures. One of the objectives was to determine which variable, from among such a set of alternatives, would be most effective in terms of strength of relationship to the response variable(s), and/or would be less confounded with other candidate independent variables. For brevity, and because there would be little value to be served for present purposes, there will be no discussion here of the many variables which were discarded in the process of reducing the data set. The remainder of this discussion will concentrate upon the relatively smaller set of variables which ultimately were carried through into the ANOVA and which were found to be of some interest or significance there.

1. Dependent Variables

All of the analysis was at the individual physician level. The data record for each physician contains a dichotomous variable to indicate participation or nonparticipation with Blue Shield. This served as the

response variable for the analyses of Blue Shield participation.

For the analyses of Medicare assignment rates, the response variables in each physician's record (assuming more than zero Medicare services reported by the physician) were the relative percentage of claim line items reported by the physician on which assignment was taken, and the relative percentage of the physician's billed charges on which assignment was taken. The claims transaction experience files created during, and remaining from, the claims processing and payment operation do not readily permit the reconstruction of whole original claims. The available transaction record is the "claim line item," which represents a single (and therefore homogenous) kind of service. For purposes of analyses using data derived from original claim transaction source files, the common practice (at least at PBS) is to consider line item records as rough surrogates for claim records. Most claims in any event contain only a single line item. Hence, it is a simple expedient to measure assignment rate in terms of line items accepted for assignment, as a proxy for claims accepted on assignment.

2. Basic Physician Characteristics

The record for each individual physician indicates his location of practice (county), degree (M.D. or D.O.), practice specialty, broad specialty category (general, medical, surgical, or other), medical school from which graduated, and status with respect to board certification and national professional association membership. A summary of frequency distributions for each of these nominal variables already has been given (on page 25).

In addition, the record indicates the physician's age (as of 1975). The original data set also contained a variable indicating number of years since licensure, but this was dropped from the final stage analyses, since in most cases it carried roughly the same informational value as the physician's age variable.

Finally, the record also includes a variable showing the number of physician associates with whom the physician is involved in his practice. This serves as a proxy for determining whether the physician practices solo, small partnership, or group. If two or more physicians practice together as a single business entity, they may establish an "assignment account" with PBS. Checks for allowed payments then are written to the assignment account instead of to individual member physicians. There is no record at PBS to indicate whether a physician's mode of practice is solo, partnership, or group, per se. There are, however, cross-reference files indicating membership in assignment accounts; and from these files it is possible to determine the number of other physicians with whom a given physcian has business association in his practice. It is assumed that business association implies clinical association.

3. Individual Physician Practice Characteristics

Several variables were derived from the data found in PBS claims transaction files (both Medicare and private Blue Shield) for each physician, to reflect some of the summary patterns and characteristics of his practice. The following is a list of those which were carried into the ANOVA and which provide the main substance of the findings to be given

later in this report:

(a) Number of Patients Seen. This gives the number of distinctly different patients seen by the physician during the course of the year, as reflected by claims transaction records. Three different variables were developed to give the number of Blue Shield patients, the number of Medicare beneficiaries, and the total number of patients seen (taking Medicare and Blue Shield together). These variables serve the straightforward purpose of indicating the sizes of the patient rosters served by physicians under two different insured programs and in aggregate.

(b) Percent of Patients Medicare. Derived from the above, this variable indicates the annual number of different Medicare patients seen as a proportion of the total number of Medicare and Blue Shield patients in aggregate.

(c) Number of Services. Three variables give, respectively, the annual total number of services reported for Blue Shield, Medicare, and in aggregate. This serves as a measure of activity, but does not differentiate between qualitatively different kinds of services, and hence cannot be interpreted as a productivity measure.

(d) Billings. Three different variables give the total annual dollar volume of a physician's billings reported on claims submitted to PBS for Blue Shield, Medicare, and in aggregate.

(e) Allowed-to-Billed Ratio. This is a measure of the relative cut-back from a physician's billed charges to the amounts allowed by the insurance carrier or program. Specifically, it represents the proportion or percentage of a physician's billed charges for the year which have been allowed as "reasonable." The relative size of the cut-backs being imposed on a physician commonly is regarded as a dominant consideration in his assignment/participation decision. The data set contains three variables giving this ratio, respectively, for Blue Shield, Medicare, and in aggregate.

(f) Mean Charge per Service. In common parlance, this serves as an indicator of whether the physician deals in "big ticket" services or in relatively lesser valued services. Three variables again have been calculated -- for Blue Shield services, for Medicare services, and for the aggregate.

(g) Mean Services per Patient. This serves as a measure of the intensity of the physician's activity relative to his patient roster. If the services being compared are relatively homogenous, a high value on this variable relative to the norm might indicate a physician who is overutilizing (or inducing demand for his own services). This variable is calculated for Blue Shield, for Medicare, and for the aggregate.

(h) Mean Annual Billing per Patient. This has rather straightforward meaning and is calculated for Blue Shield,

for Medicare, and for the aggregate.

(i) Percent UCR. This is a single variable indicating the proportion of the physician's services to Blue Shield patients which are covered and reimbursed under the UCR program. It is included because of the long-standing interest in role and impact of UCR reimbursement methodologies in the medical marketplace. One may conjecture, for instance, that where there is more UCR, there would be a higher effective price on transactions -- and that this ultimately could impact on the participation decision.

(j) Relative Price Index. This is a cross-sectional price relative, giving for each physician a composite measure of his price levels relative to statewide average price levels, weighted by the mix of services for the individual physician. Separate indexes have been calculated for a physician's experience in the Blue Shield market, in the Medicare market, and in the aggregate. The statewide average price and service mix would be represented by an index value of 100.

It should be noted that all of the above measures used to characterize a physician's practice are determined only on the basis of what is available in private Blue Shield and Medicare Part B claims transaction files at PBS. In some cases, therefore, the measures may be somewhat imperfect since they cannot reflect a physician's uninsured

activity, Medicaid activity (except for joint Medicare/Medicaid), or activity under commercial insurance programs. There is no knowledge of such activity from the sources used. On the other hand, it also may be noted that this problem is assuaged somewhat by the fact that PBS has a very dominant share of the health insurance market in the state of Pennsylvania, covering close to two-thirds of the state's population under Medicare and private Blue Shield combined.

Table III-1 displays a summary list of the physician variables discussed above (other than nominal-level variables), showing selected distribution parameters for each variable (population mean, coefficient of variation, and skewness).

4. Practice Locale (County) Variables

Each physician's practice locale is identified and characterized at the county level. These county data were gathered primarily from standard open reference sources, augmented by data derived from PBS in-house files. The county variables carried through to the ANOVA stage are listed below, sorted into three main groups: (a) general demographic and socioeconomic variables; (b) price, cost, and supply factors associated specifically with the medical services economy; and (c) medical care insurance and subsidization factors.

(a) General Demographic and Socioeconomic Factors:

Population density

Per capita income

Median years education

TABLE III-1. PERSONAL AND PRACTICE CHARACTERISTICS OF PENNSYLVANIA PHYSICIANS (1975)

Variable/Description	Mean	C.V.	Skewness
Mean number of physician associates	2.18	3.94	4.963
Physician age	52.1	.23	.204
Number of years licensed	25.8	.49	.240
Number of Blue Shield patients	127.4	1.76	8.174
Number of Blue Shield services	457.2	1.60	5.054
Total Blue Shield billings	$17,700	1.51	3.470
Blue Shield allowed/billed charge ratio	.786	.17	-.846
Mean charge per Blue Shield service	$53.85	1.48	7.640
Mean services per Blue Shield patient	3.34	.83	3.572
Mean annual billing per BS patient	$113.38	1.03	5.065
Percent BS services UCR	66.4	.32	-.671
Blue Shield price index	96.2	.27	1.031
Number of Medicare patients	119.0	1.15	4.067
Percent of patients Medicare	58.4	.55	-.282
Number of Medicare services	1,029	1.31	3.175
Total Medicare billings	$17,591	1.32	3.937
Medicare allowed/billed charge ratio	.858	.10	-1.170
Mean charge per Medicare service	$27.22	1.52	9.146
Mean services per Medicare patient	8.11	.78	1.985
Mean annual billing per Medicare patient	$128.65	.76	3.182
Medicare price index	100.5	.29	1.198
Total number of patients (BS+Medicare)	246.4	1.24	5.936
Aggregate number of services	1,341	1.29	3.314
Aggregate annual billing	$31,282	1.31	3.595
Aggregate allowed/billed ratio	.830	.12	-.964
Aggregate mean charge per service	$37.22	1.54	7.255
Aggregate mean services per patient	6.36	.81	2.385
Aggregate mean annual billing per patient	$123.76	.81	4.452
Aggregate price index	98.6	.28	1.164

Percent college graduates in population

Percent laborers in workforce

Percent workforce unemployed

Percent of families below poverty level

Percent conservative

Consumer price index (CPI)

(b) Medical Service Economy:

Price indexes for physicians' services

Mean monthly office payroll

Mean monthly pay per office employee

Number of beds in general hospitals

Hospital beds per 100,000 population

Number of direct patient care (DPC) physicians

Number of primary care (PC) physicians

DPC physicians per 100,000

PC physicians per 100,000

(c) Health Care Insurance and Subsidization:

Blue Shield enrollment

Blue Shield population penetration

Percent physicians participating Blue Shield

Total Blue Shield payments

Percent Medicare claims (line items) assigned

Total Medicare allowed charges

Per capita state medical expenditures

In group (a), all but the last two variables have definitions and potential relevance that should be familiar and well understood.

The "percent conservative" was determined from state voting records for the 1972 and 1976 national presidential elections. Those voting for Republican or Constitutional party candidates were classed as "conservative." Those voting for candidates of the Democrat or other liberal-oriented parties were classed "liberal." Votes shown as being cast for "others" were not counted, since there was no basis for determining liberal-conservative preference in these votes. The resulting variable provides an indicator of the relative political positioning of each county's population on a liberal-conservative scale. It has often been posited that liberal orientations are associated with higher rates of assignment and participation in health insurance programs.

CPI data at the county level are not available from the government or from any routinely published sources. To provide a measure of the relative cost of living in each county, the parameters of an OLS regression equation were estimated from federal CPI data, with selected population and economic indicators serving as independent variables, for Standard Metropolitan Statistical Areas (SMSAs) in and around Pennsylvania. Estimated county-level CPI figures then were projected by plugging the required population and economic indicators for each county into the regression equation.

In group (b), the "price indexes for physicians' services" are cross-sectional price relatives developed separately for Blue Shield and Medicare activity in each county. In each case, the county price index

reflects the aggregate price of the mix of services reflected in actual Blue Shield or Medicare experience files for that county, calculated at average local prices in that county, relative to the aggregate price of the same package of services at statewide average prices.

Also in group (b), the mean monthly payroll per physician's office and the mean monthly pay per employee in physicians' offices are two alternative variables which may serve as proxies for the office expense cost factor in office-based physician practices in each county.

Hospital bed supply and physician manpower supply are given both in terms of absolute numbers and relative to the population base in each county. The physician-to-population ratio is the form most commonly used by researchers, but the preliminary data reductions in this study frequently showed the absolute number form of the variable to have a stronger relationship to response variables.

In group (c), "Blue Shield enrollment" refers to the estimated actual number of Blue Shield subscribers in a county. A "subscriber" is defined as anyone covered under a Blue Shield agreement, including family members as well as the specific individual in whose name the agreement was issued. "Blue Shield population penetration" is defined here as the percentage of the county population who are estimated to be Blue Shield subscribers.

Per capita state expenditure includes all expenditures by the state government for programs with direct medically-related purposes.

Table III-2 provides a summary listing of these variables, characterizing their distributions in terms of population means, coefficients of variation, and skewness. It should be remembered that

TABLE III-2. PRACTICE LOCALE (COUNTY) CHARACTERISTICS AND DISTRIBUTION PARAMETERS (c. 1975)

Variable/Description	Mean	C.V.	Skewness
Population density (per sq. mi.)	3,997	1.41	1.202
Per capita income	$3,172	.16	.759
Median years education	11.66	.05	-.293
Percent college graduates in population	9.08	.42	1.171
Percent laborers in workforce	4.76	.24	.795
Percent workforce unemployed	5.67	.22	-.299
Percent of families below poverty level	7.81	.37	.244
Percent conservative	47.37	.21	-.214
Consumer price index (CPI)	116.4	.04	-.739
County level Blue Shield price index	101.4	.12	-.152
County level Medicare price index	98.5	.11	-.180
Mean monthly office payroll	$4,806	.21	.042
Mean monthly pay per office employee	$1,307	.17	.047
Number of beds in general hospitals	4,651	1.04	.617
Hospital beds per 100,000 population	480.1	.39	.179
Number of direct patient care physicians	984.5	.85	.240
Number of primary care physicians	440.9	.90	.603
DPC physicians per 100,000	114.2	.34	1.917
PC physicians per 100,000	50.7	.24	.355
Blue Shield enrollment	554,830	1.04	.545
Blue Shield population penetration	54.5%	.41	-.254
Percent physicians participating BS	82.5%	.08	-.582
Total Blue Shield payments ($ millions)	$16.667	.94	.458
Percent Medicare claims assigned	48.1%	.29	-.446
Total Medicare allowed charges ($ millions)	$24.956	1.09	.870
Per capita state medical expenditure	$68.38	.56	2.380

these are not "average county" data distributions. Rather, they are distributions which follow and reflect the distribution of individual physicians by county.

IV. FINDINGS: MEDICARE ASSIGNMENT

Physicians in this study showed an average line item assignment rate of 37.7 percent. This is the unweighted mean of the individual line item assignment acceptance rates calculated for each of the 9,102 physicians represented in the Medicare experience portion of the study data base, and should not be confused with an aggregate assignment rate for all claims represented in the data base (which would be higher). The corresponding average assignment rate on billed charges was 45.1 percent -- i.e., the physicians in this sample on average took assignment on 45.1 percent of the billed charges they (or their patients) submitted to the Medicare carrier (PBS) for payment.

The bar charts in Figures 1(a) and 1(b) show the distribution of the physician population response rates to the Medicare assignment option, with individual physician assignment rates coded into 10 percent intervals. Figure 1(a) shows that line item assignment rates have a distribution that is roughly U-shaped, indicating a tendency toward a bipolar response to the Medicare assignment option. It can be seen that 14.0 percent of physicians always, or nearly always, take assignment; and 40.2 percent never, or hardly ever, take assignment. More than half of the physicians (54.2 percent) are concentrated into the ten percent response intervals at either end of the distribution. Very few -- only 9.5 percent -- are in the 41 percent to 60 percent range, which is the zone of maximum indeterminacy for the assignment decision. These are physicians for whom there would be roughly equal likelihood of taking or rejecting assignment on any given claim, and who therefore are most likely

FIGURE 1(a). Percentages of Physicians Taking Assignment on Given Percentages of Medicare Line Items

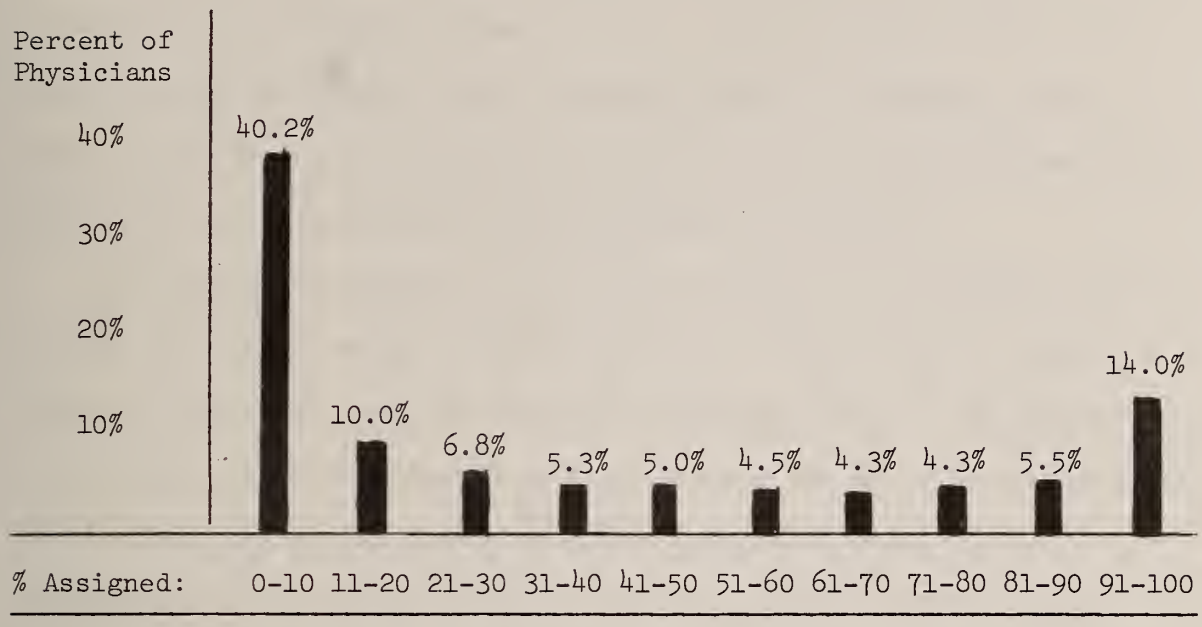
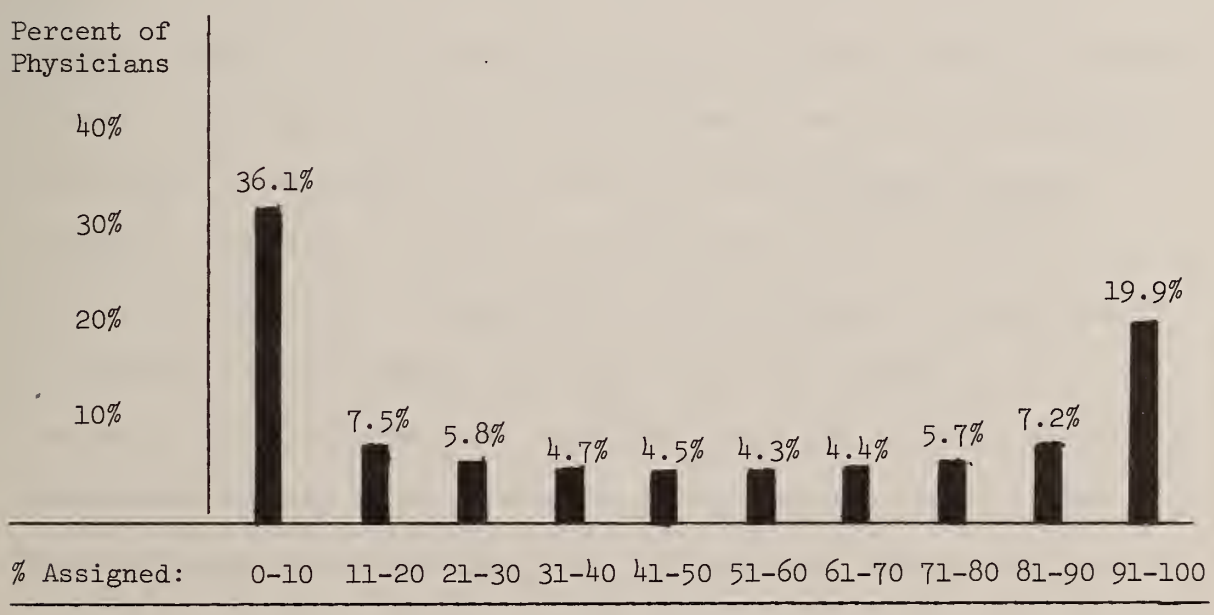


FIGURE 1(b). Percentages of Physicians Taking Assignment on Given Percentages of Medicare Billings



to exhibit claim-by-claim discrimination in their assignment decision process. Even if the relatively indeterminate zone in the middle of the distribution is extended to span a full 40 percent in the middle of the possible response range, it still contains only 19.1 percent of the physicians. Clearly, most physicians have solidly crystallized attitudes, with little or no indecision on the assignment question.

The average assignment rates of 37.7 percent for line items, and 45.1 percent for billed charges, are considerably smaller than the figures one ordinarily sees published for Medicare assignment rates. Pennsylvania Blue Shield, as the Medicare Part B carrier for the state of Pennsylvania, has for many years been reporting claims assignment rates in the neighborhood of 65 percent and more. Official PBS and HCFA figures also consistently state that more than 70 percent of the Medicare dollar volume in Pennsylvania is taken on assignment. While this seems to present an uncomforatable discrepancy between the officially reported figures and the much smaller figures determined in this study, the apparent discrepancy is not hard to reconcile. The 60 and 70 percent figures represent the aggregate proportion of all Medicare claims or dollars on which assignment is taken. This study's figures in the 30 and 40 percent range represent the averages of assignment rates for all of the individual doctors included in the study. It says, in other words, that a "typical" physician in the state of Pennsylvania takes assignment on approximately 37.7 percent of his reported line items; and this probably is a reasonably accurate estimation. What this study also reveals, as will be demonstrated in some of the statistics to be presented later, is that those individual physicians with very high Medicare volumes also tend to

have higher than average individual assignment rates. Thus, a relatively small proportion of physicians contribute a relatively large proportion of assigned claims (or line items) and assigned Medicare dollars. A relatively much larger proportion of physicians, on the other hand, have comparatively low Medicare volumes and relatively low individual assignment rates. It is this large number of physicians with low assignment rates, who also happen to have low Medicare volumes, that manages to bring down the average assignment rate when it is calculated on an individual physician basis, but who -- because of their low volume -- have little impact on aggregate assignment statistics.

A. ASSIGNMENT RATE VARIATION BY GENERAL PHYSICIAN CHARACTERISTICS

This subsection examines the variation in physicians' Medicare assignment rates by selected individual physician characteristics. In all cases, unless otherwise specified, the analysis focuses upon assignment acceptance rate for claim line items. The justification and rationale for taking the line item as the basic unit of measurement of assignment rates has previously been discussed. Essentially, the use of the line item as the basic unit of analysis is necessitated by the fact that original whole claims cannot readily be reconstructed from the computerized transaction history files remaining as a by-product of the claims processing and payment operation (and used as a primary data source for the study data base). In this circumstance, the "line item" is the best available proxy for a "claim," which would be the natural unit of analysis.

Table IV-1 shows comparative assignment rates by a number of nominal

characteristics which may be used as physician descriptors. Looking first at a breakdown by broad generic specialty groupings, it can be seen that the lowest average assignment rate is that of the physician in general practice (which for purposes of this analysis also includes family practice). These generalists have an average assignment rate of 27.5 percent. Specialists classed as "other" (anesthesiologists, radiologists, pathologists, etc.) have the highest assignment rate at 51.0 percent. Medical specialists and surgical specialists have rates very similar to one another, at 42.4 and 42.9 percent, respectively.

Providing further depth to these figures, it also can be seen that only 6.7 percent of physicians in general/family practice take assignment consistently (i.e., take assignment on more than 90 percent of the line items reported on their claims), compared to a high of 28.0 percent of physicians in "other" specialties. Conversely, as might be expected from these findings, general/family practitioners also have the greatest proportion (45.6 percent) consistently declining assignment (defined as an assignment rate of 10 percent or less).

The table also shows mean assignment rates, and proportions of physicians consistently accepting or declining assignment, for some selected specific major specialties. General surgeons are seen to have relatively high rates of assignment acceptance. Although not explicitly shown in the table display, specialties having the highest assignment rates are nephrology (86.2 percent), physicial medicine-rehabilitation (76.4 percent), and medical oncology (67.2 percent). The lowest rates are for opthal-otolaryngorinology (EENT -- 10.3 percent), allergy (13.8 percent), gynecology (20.0 percent), and opthalmology (20.3 percent). It

TABLE IV-1. MEDICARE ASSIGNMENT BY SELECTED PHYSICIAN CHARACTERISTICS

Variable/Breakdown	Mean LI Assignment Rate	Percent Taking Assignment on: More than 90%	10% or less	C.V.	N
Specialty Group:					
General/Family Practice	27.5%	6.7%	45.6%	1.131	3,279
Medical Specialties	42.4%	17.1%	42.4%	.887	2,304
Surgical Specialties	42.9%	16.8%	33.7%	.854	3,025
Other Specialties	51.0%	28.0%	33.3%	.778	494
Selected Specific Specialties:					
General Practice	27.3%	6.9%	46.3%	1.148	2,488
Family Practice	28.2%	6.1%	43.5%	1.080	791
General Surgery	57.7%	27.4%	21.0%	.619	891
Internal Medicine	41.2%	16.7%	34.4%	.883	1,343
Obstetrics-Gynecology	33.7%	7.3%	40.4%	.963	602
Pediatrics	25.7%	4.7%	91.4%	1.533	90
Physician Degree:					
M.D.	37.3%	13.5%	40.7%	.960	8,019
D.O.	40.0%	18.0%	36.1%	.937	1,083
Board Certification:					
Yes	42.0%	16.9%	38.6%	.885	3,731
No	34.7%	11.9%	41.4%	1.009	5,371
AMA or AOA Membership:					
Yes	35.8%	12.3%	40.4%	.978	7,123
No	44.2%	19.8%	39.5%	.875	1,979
Number of Physician Associates:					
None (solo)	37.3%	13.3%	39.2%	.950	7,742
1-3	26.5%	10.9%	61.2%	1.358	601
4-14	46.6%	23.4%	36.5%	.847	325
15 or more	52.1%	24.0%	31.7%	.724	434

TABLE IV-1. MEDICARE ASSIGNMENT BY SELECTED PHYSICIAN CHARACTERISTICS (continued)

Variable/Breakdown	Mean LI Assignment Rate	Percent Taking Assignment on: More than 90%	10% or less	C.V.	N
Medical Education:					
Pennsylvania Medical School	34.5%	12.0%	42.6%	1.015	6,290
Other U.S. School	39.4%	14.7%	38.5%	.919	1,932
FMG	55.5%	26.3%	27.2%	.657	880
Physician's Age Decile:					
(1) Age 35 or less	58.0%	29.8%	27.5%	.651	---
(2) 36-40	49.2%	21.7%	34.7%	.779	---
(3) 41-44	45.8%	20.8%	35.5%	.821	---
(4) 45-48	40.5%	15.1%	36.2%	.889	---
(5) 49-51	35.1%	12.3%	40.8%	.990	---
(6) 52-55	36.7%	11.6%	40.1%	.956	---
(7) 56-59	34.1%	9.4%	41.3%	.988	---
(8) 60-63	30.0%	8.1%	44.5%	1.074	---
(9) 64-68	28.3%	7.3%	45.8%	1.118	---
(10) 69 or older	22.0%	4.2%	54.7%	1.296	---

may be noted that those specialties with the highest assignment rates may be expected to encounter a relatively high proportion of elderly patients.

The coefficient of variation (C.V.) provides a measure of the relative concentration or dispersion of the assignment rates for individual physicians included in a cohort. A low C.V. indicates that the physicians as a group are relatively consistent and homogeneous with respect to their assignment acceptance rates; a high C.V., on the other hand, indicates a high degree of variation and broad dispersion in the individual assignment rates for physicians in such a cohort. The data in the table show, for instance, that general practitioners and pediatricians exhibit highly disparate behavior in their assignment decisions, while general surgeons may be noted to be relatively much more similar to one another in their assignment decisions. It is most interesting to note that, in general, there is an inverse relationship between assignment rate and C.V. Physicians in cohorts with high assignment rates seem to be relatively uniform in their apparent preference to take assignment with some consistency. Cohorts with low assignment rates tend to show much less agreement between individual physicians with respect to their assignment acceptance.

In general, the findings show considerable assignment rate variation between specialties. This is evident to some extent even at the level of broad generic classes of specialties (e.g., general versus surgical specialties), but is most pronounced between different specific specialties. Analysis of variance (ANOVA) shows that the breakdown by broad specialty classification accounts for 4.7 percent of the variance in assignment rates. Specific specialty accounts for fully 14.5 percent of

the variance.

D.O. physicians have assignment rates that are marginally higher than those for M.D. physicians; and physicians who are AMA or AOA members have lower average assignment rates. These two variables each explain less than one percent of the variance in individual assignment rates, and thus would appear to have very little influence on the assignment decision.

Board certified physicians show higher average rates of assignment, and more internal consistency (lower C.V.) in their assignment behavior as a group, when compared to physicians who do not have board certification credentials. The overall average assignment rate for board certified physicians was found to be 42.0 percent, compared to 34.7 percent for those without board certification. When one looks at board certification status and broad specialty classification simultaneously -- in effect controlling for specialty class -- the results become mixed. Board certified physicians again appear as those having higher average assignment rates among the generalists and medical specialists, but have lower rates among surgical and other specialties. This is shown in Table IV-2. In any event, ANOVA shows board certification status to account for a mere one percent of the variance in individual physician assignment rates.

Solo practitioners (those indicated as having no physician associates) have an average assignment rate of 37.3 percent. Physicians practicing in very small groups or partnerships have a lower rate (26.5 percent); but those in medium to large sized groups have notably higher average rates. Those with between four and fourteen associates have an average rate of 52.1 percent. The tendency for more assignment acceptance

TABLE IV-2. MEAN PERCENT OF LINE ITEMS ASSIGNED, BY SPECIALTY GROUP AND BOARD CERTIFICATION

	General Practice	Medical Specialties	Surgical Specialties	Other Specialties
Board Certified	30.2%	45.0%	41.0%	50.3%
Not Board Certified	27.2%	40.1%	46.5%	52.2%

TABLE IV-3. MEAN PERCENT OF LINE ITEMS ASSIGNED, BY SPECIALTY GROUP AND NUMBER OF ASSOCIATES

	General Practice	Medical Specialties	Surgical Specialties	Other Specialties
No Associates	27.5%	42.1%	43.6%	51.3%
1-3 Associates	19.1%	27.8%	27.7%	39.4%
4-14 Associates	37.8%	42.5%	54.4%	56.9%
15 or more Associates	44.8%	55.9%	47.2%	57.8%

in larger groups is clear. Table IV-3 shows these effects continuing to hold more-or-less true when controlling for broad specialty class. Number of physician associates, when treated in terms of the four intervals defined for Table IV-3, accounts for 1.6 percent of the variance in assignment rate.

Graduates of medical schools located in the state of Pennsylvania have an average assignment rate of 34.5 percent. Those from medical schools located in other parts of the United States have a slightly higher rate, at an average of 39.4 percent. Foreign medical graduates have the highest rate, 55.5 percent. This is consistent with previous findings by others, and is consistent with the expectation from theory.

The decile breakdown by physician's age in Table IV-1 shows a marked and very well defined tendency for younger physicians to have higher rates of assignment acceptance, and for older physicians conversely to have lower rates. The distribution of averge assignment rates proceeds very evenly and uniformly from a high of 58.0 percent average assignment for the youngest ten percent of physicians (aged 35 or younger), to a low of 22.0 percent average assignment for the oldest ten percent (aged 69 or older). This is distinctly in opposition to the anticipated result suggested by theory earlier, in Section II.A.2 of this report. It is, however, consistent with the findings of Paringer (1980). Yett et al. (1981) found mixed results on the effects of the physician's age variable. As noted earlier, the results by physician's age decile once again show a well defined inverse relationship between average assignment rate and internal consistency of assignment behavior (C.V.) for the physician groups defined by age decile. The youngest physicians, while

having the highest average assignment rate, also exhibit the most consistent and well focused assignment behavior as a group. The oldest physicians, with the lowest average assignment rate, show the most disparate group behavior. On the whole, physician's age emerges as a relatively significant factor, accounting for 7.7 percent of the variance in assignment rates.

B. ANALYSIS BY PRACTICE CHARACTERISTICS

For purposes of further in-depth analysis in this study, attention is focused upon comparative characteristics of three distinctly different cohorts of physicians, exhibiting three different extremes of assignment behavior. These are: (1) physicians who consistently take assignment, defined as those having more than 90 percent of their Medicare line items assigned; (2) physicians who consistently decline or refuse assignment, defined as those having 10 percent or less of their Medicare line items assigned; and (3) those who exhibit the most indeterminate and unpredictable behavior, possibly discriminating on a claim-by-claim basis, with almost equal a priori likelihood of accepting or rejecting assignment. This last group is defined to contain the 19.5 percent of physicians having assignment rates in the range of 31 to 70 percent -- i.e., the "indecisive middle" of the assignment distribution. To deliberately exaggerate these three extreme modes of behavior, and to enhance the differences between them, physicians in the "grey areas" (assigning 11-30 percent and 71-90 percent) are ignored.

Three different sets of variables were established, as previously

outlined and discussed in Sections III.B.3 and III.B.4 of this report, containing factors to describe the physician's practice with Medicare patients, his overall practice (here defined as only Medicare and Blue Shield patients), and his practice locale (at the county level). The means of these variables were calculated for each of the three distinct cohorts of physicians defined above, and analysis of variance (ANOVA) was used to determine to what extent the variance in each descriptor variable is explained by the partitioning of the physician population into the three extreme assignment behavior classes.

ANOVA results for each of the three sets of variables are presented and discussed below.

1. Medicare Practice Characteristics

Table IV-4 displays the group means of nine key variables that may be used to describe a physician's Medicare practice, for groups of physicians exhibiting three distinctly different modes of assignment behavior, as described above. All of the factors are statistically significant. The apparent association between each of these factors and physicians' responses to the assignment option may be summarized as follows:

(a) Assignment rate is directly related to the size of the physician's Medicare patient roster. In particular, physicians with relatively small Medicare patient rosters show a marked tendency to consistently refuse assignment.

(b) There is a mild tendency for physicians with relatively

TABLE IV-4. MEDICARE PRACTICE CHARACTERISTICS, BY MEDICARE ASSIGNMENT RATE

	Mean Value for Physicians Taking Assignment on:			
	10% or less Line Items	31-70% of Line Items	More than 90% of Line Items	Eta Squared
Number of Different Medicare Patients Seen	79.9	144.2	148.9	.0641
Percent of Patients Medicare	59.4%	57.6%	54.5%	.0031
Annual Number of Medicare Services	734	1,170	1,310	.0347
Total Annual Medicare Billings	$9,514	$19,193	$29,658	.1207
Medicare Allowed/Billed Charge Ratio	.867	.861	.830	.0258
Mean Charge per Medicare Service	$16.89	$27.14	$47.20	.0826
Mean Annual Services per Medicare Patient	7.88	8.18	8.37	.0010
Mean Annual Billing per Medicare Patient	$89.57	$130.89	$203.23	.1965
Medicare Relative Price Index	97.0	99.3	113.8	.0472

larger proportions of Medicare patients in their overall patient mix to take less assignment.

(c) Physicians delivering larger numbers of services in their Medicare practice accept more on assignment.

(d) Physicians with larger total annual Medicare billings take more on assignment.

(e) Proportionately larger cut-backs from billed to allowed charge do not have a negative impact on assignment acceptance. On the contrary, greater assignment rates are seen to be correlated with smaller proportions of billed charges allowed -- i.e., with larger cut-backs. This is contrary to popular intuition and theory.

(f) Physicians dealing in larger-valued types of services in their Medicare practices take more on assignment.

(g) There is a mild -- almost negligible -- tendency for physicians exhibiting a higher intensity of services per patient in their Medicare practice to take more assignment.

(h) Physicians with larger annual billings per Medicare patient are strongly disposed to take more assignment.

(i) Physicians who are relatively high-priced (as Medicare providers) take more assignment.

The eta squared statistic is a measure of the proportion of variance in the distribution of the descriptor variable that is explained by the assignment behavior classes. The values shown in Table IV-4 indicate a rather strong relationship of assignment rate to mean annual

billing per Medicare patient (19.7 percent of variance explained), and to the physician's annual total Medicare billing (12.1 percent of variance explained). There also is indicated a moderate relationship to mean charge per Medicare service, which serves an an indicator of whether the physician deals in relatively larger-valued or smaller-valued services, and to the size of the physician's Medicare patient roster. These have, respectively, 8.3 percent and 6.4 percent of variance explained. The small eta squared values for percent of patients Medicare and for mean annual services per Medicare patient suggest that these factors are of little consequence relative to Medicare assignment.

In summary, it would appear that the Medicare practice factors of greatest importance to the physician's Medicare assignment decision are mean annual billings, the general value level of the services in which he deals, and the size of his Medicare patient roster, in that order. To assess probable directional effects, the findings suggest that the physician will be more likely to have a larger Medicare assignment rate if he has a larger roster of Medicare patients, if he deals in relatively higher-valued services, and if he has a large Medicare dollar volume.

2. Overall Practice Characteristics

Table IV-5 displays the group means for eight key variables describing a physician's overall practice, for each of the three physician assignment response groups. Again, all of the factors are significant. The relationships of each factor to the assignment response are summarized below:

TABLE IV-5. OVERALL PRACTICE CHARACTERISTICS, BY MEDICARE ASSIGNMENT RATE

	Mean Value for Physicians Taking Assignment on:			
	10% or less Line Items	31-70% of Line Items	More than 90% of Line Items	Eta Squared
Total Number of Different Patients Seen	168.3	293.8	327.2	.0562
Aggregate Annual Number of Services	850	1,641	1,905	.0700
Aggregate Total Annual Billings	$16,497	$36,115	$55,222	.1499
Aggregate Allowed/Billed Charge Ratio	.839	.834	.795	.0266
Aggregate Mean Charge per Service	$28.61	$38.85	$54.60	.0310
Aggregate Mean Annual Services per Patient	6.12	6.51	6.59	.0016
Aggregate Mean Annual Billing per Patient	$94.52	$129.48	$185.67	.1174
Aggregate Price Index	95.2	97.5	111.0	.0467

(a) Physicians with larger overall patient rosters take more on assignment.

(b) Physicians delivering larger overall volumes of services take more on assignment.

(c) Physicians with larger dollar volumes of overall annual billings take more assignment.

(d) Physicians who experience larger proportionate cut-backs in their combined Blue Shield and Medicare practice take more on assignment. Again, this is contrary to popular intuition and theory.

(e) Physicians who deal in higher-valued services take more on assignment.

(f) There is a mild tendency for physicians who have relatively high assignment rates to also exhibit a slightly greater intensity of services per patient.

(g) Physicians with higher mean annual billings per patient take more on assignment.

(h) Physicians with generally higher prices take more on assignment.

The eta square statistics indicate a strong relationship of assignment rate to total annual billings (15.0 percent of variance explained), and to the average annual billing per patient (11.7 percent of variance explained). A more modest, but still meaningful, relationship exists for total volume of services delivered (7.0 percent explained) and

for the size of the combined Blue Shield and Medicare patient roster (5.6 percent explained). These factors, in the order identified, would appear to be the overall practice characteristics of greatest importance in the physician's assignment decisions. Essentially paralleling the findings for Medicare practice characteristics, a physician is more likely to have a larger Medicare assignment rate if he has a large dollar volume in his practice and if he has a relatively large patient roster.

Comparing the findings for overall practice with the findings for the Medicare component of a physician's practice, it is interesting to note that the annual dollar volume in the overall practice appears to be a more important factor than relative dollar volume in Medicare alone. On the other hand, the average annual billing per Medicare patient dominates the mean annual billing per patient in the overall practice. It also appears that the relative size of the Medicare patient roster is slightly more important to the assignment decision than is the relative size of the overall patient roster.

3. Average Fee Levels Assigned and Unassigned

In general, assigned services or line items have higher average billed charges than their unassigned counterparts. Overall, the mean billed charge per assigned line item is $54.75; for unassigned line items, the mean billed charge is $25.24. This general relationship between average billed charges for assigned and unassigned line items holds through all stratifications and breakdowns of the physician population. By broad specialty class, for instance, generalists average $19.74 per assigned line item and $11.07 per unassigned line item;

medical specialists average $34.45 assigned and $18.57 unassigned; surgical specialists average $105.08 assigned and $43.66 unassigned; and other specialists average $52.52 assigned and $39.06 unassigned. This dominance of the assigned over the unassigned average charge per line item continues for breakdowns by board certification, medical school, number of physician associates, and all other nominal physician descriptors used in this study. One final specific comparison might be of interest: Physicians with assignment rates of 10 percent or less have a $50.99 average billed charge per assigned line item, and an average billed charge of $20.11 per unassigned line item. Physicians with assignment rates of better than 90 percent average $67.38 per assigned line item and $41.55 per unassigned line item. The average billed charge, whether assigned or unassigned, is consistently larger for the physician who nearly always takes assignment than it is for the physician who hardly ever takes assignment. Also, the gap between the average assigned and the average unassigned charge is much larger for the physician who consistently declines assignment than for the physician who consistently accepts assignment.

C. ANALYSIS OF CHARACTERISTICS OF PRACTICE LOCALE

Physicians' practice locales for purposes of this study are taken at the county level. There is substantial variation in Medicare assignment acceptance rates by county in Pennsylvania. For counties represented by more than ten physicians in the sample drawn for this study, average assignment rates for individual physicians grouped by county range from

highs of 61.8 percent for Susquehanna County and 61.0 percent for Vanango County, to lows of 14.8 percent for York County and 18.8 for Berks County. The general tendency is for the several counties with the highest averages of individual physicians' assignment rates to be located in the state's sparsely populated, wooded, and mountainous northern tier. The counties with the lowest average assignment rates are those associated with some of the state's more prosperous lesser metropolitan areas -- counties containing the cities of York, Reading, Lancaster, Harrisburg, and the Allentown-Bethlehem-Easton metropolitan area. Philadelphia physicians have an average assignment rate of 49.3 percent; and the four counties comprising suburban Philadelphia have an average 34.4 percent assignment rate. Allegheny County, containing the City of Pittsburgh, has a 40.1 percent average assignment rate. As has been noted earlier in this report, it is interesting to observe that the coefficients of variation (C.V.) calculated for each county indicate that those places with the highest average assignment rates also have the tightest concentrations of individual physicians' assignment rates -- i.e., relatively well-focused and homogenous physician response to the assignment option. Places with the lowest average assignment rates have the greatest dispersion of individual physicians' assignment rates. Overall, the breakdown by counties accounts for 7.9 percent of the variance in physicians' rates of assignment.

Following is a more detailed examination of some specific locality variables in relation to physician behavior under the Medicare assignment option. As in the earlier analysis by physician practice characteristics, attention is focused upon the comparative characteristics of three cohorts

of physicians exhibiting different extremes of assignment behavior: (1) those who consistently take assignment; (2) those who consistently decline assignment; and (3) those whose behavior is the most inconclusive and unpredictable, possibly discriminating on a claim-by-claim basis. The operational definitions for these three classes of physicians are as before: (1) physicians taking assignment on more than 90 percent of line items; (2) physicians taking assignment on 10 percent or less of line items; and (3) those with assignment rates in the 31 to 70 percent range.

The locality (county) variables are as outlined previously in Section III.B.4. They include three subclasses of variables: (1) general demographic and socioeconomic factors; (2) factors relating to the medical service economy -- factors which in economic terms would be thought of as cost and supply variables; and (3) factors describing health care insurance and subsidization in the medical services marketplace. As before, the means of these variables are calculated for physicians in each of the three assignment response classes, and ANOVA is used to determine whether the group means are significantly different, and to determine the extent to which the variance in each locality variable is explained by the breakdown into assignment response classes.

1. General Demographic and Socioeconomic Factors

Group means for all of the locality variables are displayed in Table IV-6. The data are circa 1975. Variables contained in the first block in this table are the demographic and socioeconomic factors. All of them are significant. Their observable apparent associations with physicians' assignment rates are summarized below:

TABLE IV-6. COMPARATIVE CHARACTERISTICS OF PHYSICIANS' PRACTICE LOCALES (COUNTY LEVEL), BY MEDICARE ASSIGNMENT RATE

	Mean Value for Physicians Assigning:			
	≤ 10% Line Items	31-70% Line Items	> 90% Line Items	Eta Squared
General Demographic/Socioeconomic:				
Population density	3,394	3,774	6,236	.0367
Per capita income	$3,227	$3,093	$3,167	.0126
Median years education	11.70	11.66	11.54	.0103
Percent college graduates	9.43%	8.71%	8.88%	.0076
Percent laborers in workforce	4.66%	4.89%	4.75%	.0081
Percent workforce unemployed	5.41%	5.89%	6.04%	.0500
Pct. families below poverty level	7.33%	8.13%	8.67%	.0312
Percent voted conservative	48.70%	46.94%	43.75%	.0349
Consumer price index	116.2	116.0	117.7	.0204
Medical Service Economy:				
Relative price index for physicians' Medicare services	98.1	97.6	101.7	.0210
Mean monthly office payroll	$4,810	$4,763	$4,901	.0021
Mean monthly pay per employee	$1,301	$1,303	$1,343	.0055
Number of general hospital beds	4,153	4,454	6,650	.0387
Hospital beds per 100,000	461.2	486.6	535.6	.0222
No. direct patient care physicians	924	925	1,306	.0326
Number of primary care physicians	405	415	605	.0380
DPC physicians per 100,000	117.27	109.58	115.24	.0070
PC physicians per 100,000	51.35	49.02	51.87	.0080
Insurance and Subsidization:				
Blue Shield enrollment	500,976	528,029	782,770	.0348
Blue Shield penetration	53.63%	53.31%	59.23%	.0100
Pct. physicians Blue Shield par.	81.7%	83.2%	83.6%	.0172
Blue Shield payments ($ millions)	$15.469M	$15.731M	$22.551M	.0310
Pct. Medicare line items assigned	45.6%	49.4%	54.1%	.0545
Medicare allowed charges ($ mil.)	$22.154M	$23.561M	$36.372M	.0395
Per cap. state med. exp.	$64.08	$65.32	$81.03	.0290

(a) Assignment rates are higher at places where there is higher population density. This seems to be at odds with the earlier observation that the counties with the highest average assignment rates are in the sparsely populated northern tier. These northern tier counties, on the other hand, also tend to have relatively few physicians. It is likely that in these statistical calculations they are dominated by the large number of physicians in Philadelphia, for instance, who also have relatively high assignment rates.

(b) The influence of per capita income is mixed and unclear.

(c) Population education, as measured by median years of schooling, shows a weak relationship indicating lower rates of assignment where there is relatively higher educational attainment.

(d) Higher education, measured by the percentage of population who have four or more years of college, shows no clear effect. To the extent that anything is discernable, it may be suggested that places with greater proportions of college graduates tend to have less assignment acceptance.

(e) The general quality and nature of the locality's workforce, as indicated by the percentage of laborers in the workforce, shows very little variation and very little effect. What effect there may be is mixed and unclear.

(f) There seems to be a clear tendency for assignment rates to

be higher where there are higher rates of unemployment. This may suggest a service or charity motive on the part of many physicians.

(g) Physician assignment rates are somewhat higher where there are relatively more families below the poverty level, and are lower where there are fewer families below the poverty level. As in the preceding item, this may indicate physician response to a population need.

(h) There is a clear, although modest, tendency for assignment rates to be lower where the local population base has a politically more conservative orientation. Conversely, this also suggests higher assignment rates at places where there is a more liberal orientation.

(i) There is a weak tendency for higher assignment rates at places where the cost of living is higher.

None of these factors is very strong. The eta squared statistic indicates that unemployment, with 5.0 percent of variance explained, is the most influential factor in this group. Other factors with at least slight influence would be population density, political orientation (liberal-conservative), and the proportion of families below the poverty level. None would appear to be very strong determinants in the assignment decision, however, each having barely more than three percent of their variance accounted for.

With respect to this subset of locality variables, it may be suggested that assignment rates tend to be higher in urbanized locales

where there is a slightly greater conservative presence, and where physicians face a population need in the form of relatively greater unemployment and poverty levels.

2. Medical Services Economy

These factors, with group means displayed in the middle block in Table IV-6, generally would be considered cost and supply factors in economic analysis terms. All of these factors are significant. Observations on these variables are summarized as follows:

(a) There appears to be a tendency for high assignment rates at places where there are a greater number of high-priced physicians. Beyond this, there is no clear definition to the effect of the price level factor.

(b) Physicians' office expenses, as measured by the mean monthly payroll in physicians' offices, exhibit very little variation. This factor has no clear practical effect.

(c) Physicians' office expenses, measured by the mean monthly pay per employee in physicians' offices, also shows very slight variation. The factor's effect is in a direction indicating higher assignment rates corresponding to higher office wages. The effect, however, appears to be very weak.

(d) Higher rates of assignment are associated with places where there are greater numbers of hospital beds available.

(e) Higher assignment rates also are associated with higher

levels of hospital bed supply when measured in relation to the locality's population base.

(f) Assignment rates are high where there are relatively large numbers of physicians. For localities with smaller numbers of physicians, it is difficult to differentiate between an indeterminate reponse and a low assignment rate response. These observations hold whether measured in terms of primary care physicians or in terms of direct patient care physicians. The relationship is slightly more well-ordered for the primary care physician supply factor.

(g) When physician supply is measured relative to the local population base, the relationship to physician assignment rates is not entirely clear. The data seem to suggest a U-shaped function to describe physician assignment response as a function of physician-to-population ratio, whether expressed in terms of primary care physician supply or supply of all direct patient care physicians. The U-shape function suggests that, where there is a high level of physician supply relative to population, there is a more definitive response (one way or the other) to the assignment option. This then also implies that, where the physician supply relative to population is smaller, physicians would be more prone to discriminate on a claim-by-claim basis in the assignment decision.

All of these factors are relatively weak. The strongest appear to be the hospital bed count and the physician counts; but even in these, hardly more than three percent of the variance is accounted for. It is interesting to note that the hospital bed and physician supply variables measured in terms of absolute numbers show a stronger relationship than the analogous supply variables measured relative to the population base. Also, physician supply measured in terms of primary care physicians shows a stronger response than physician supply measured in terms of all direct patient care physicians.

In this subset of locality variables, the results may be summarized as suggesting that hospital bed supply and physician supply (measured in terms of absolute numbers) have some modest influence on assignment rates, with assignment rates tending to be higher where supplies are greater.

3. Health Care Insurance and Subsidization Factors

Group means for these variables are displayed in the lower block of Table IV-6. In economic analysis terms, these would principally be considered demand variables. All of them are significant. These variables show relationships as summarized below:

(a) Medicare assignment rates increase directly with increases in Blue Shield enrollment.

(b) Using Blue Shield penetration relative to the locality population base as a measure of Blue Shield presence in the market, there is little or no discrimination between a

negative response and an indeterminate response on Medicare assignment. High assignment rate, however, is associated with relatively high Blue Shield population penetration. On the whole, this is a weak variable.

(c) Medicare assignment increases slightly in association with increases in physician Blue Shield participation by locality. The effect is weak, however.

(d) High levels of Blue Shield payments in a locality are associated with high levels of assignment acceptance. The discrimination between low and indeterminate assignment responses, however, is weak.

(e) Individual physician assignment rate is shown to have a well-ordered and moderately strong relationship to the average percentage of line items assigned by all doctors in a locality. This relation may suggest that the individual physician is more inclined to accept assignment in localities where his physician colleagues have a high aggregate assignment rate.

(f) Higher assignment rates are associated with localities having higher total Medicare charges allowed.

(g) Greater amounts of state money going to a locality for medical programs are associated with higher assignment rates.

The eta squared statistics show the most influential variable from this group to be the percent of Medicare line items taken on

assignment in the locality. The assignment response classes account for 5.5 percent of the variation in this factor. Somewhat more modestly related, with a bit more than three percent of variation explained for each, are Blue Shield enrollment, total Blue Shield payments, and total Medicare allowed charges.

These results tend to confirm, as suggested by theory, that assignment rates will be higher where there is more money getting into the market from private insurance programs and from government. The results also suggest, as discussed above, that physicians may tend to follow their local colleagues in making the assignment decision.

V. FINDINGS: BLUE SHIELD PARTICIPATION

For the 9,827 physicians represented in the project data base, the overall rate of Blue Shield participation was 87.5 percent. Company records maintained by Pennsylvania Blue Shield indicate that, over the past several years, the proportion of doctors listed in the PBS provider masterfile as participating has hovered around the 80 percent level. The 87.5 percent participation rate determined from the project data base is reasonably consistent with the approximately 80 percent participation suggested over the long term by company records. This follows from the facts that: (1) the company provider masterfile contains roughly twice as many physicians as are represented in the project data base; (2) the physicians represented in the project data base were selected specifically because they have at least minimally significant volumes of Blue Shield claims experience, whereas many of the remainder of the physicians listed in the PBS physician masterfile hardly ever submit a Blue Shield claim; and (3) there is an *a priori* perception that physicians who rarely, if ever, submit claims to Blue Shield do not tend to participate. Among physicians who regularly submit claims to Blue Shield, 87.5 percent probably is a reasonably accurate estimate of the participation rate. PBS company records for a number of recent years also show a relatively stable long-term figure in the neighborhood of 85 percent for the proportion of Blue Shield payment dollars going to participating physicians.

A. PARTICIPATION BY GENERAL PHYSICIAN CHARACTERISTICS

Physician participation with Blue Shield is an all-or-nothing proposition. As previously discussed in Section I.A., a participating physician in effect "takes assignment" on all of his Blue Shield claims; a nonparticipating physician takes assignment on none of his Blue Shield claims. Thus, in measuring and studying Blue Shield participation, there is nothing analogous to the "assignment rate" calculated at the individual physician level for Medicare. The term "participation rate" has meaning only in relation to a population or given cohort of physicians, in which sense it then describes the relative proportion or percentage of physicians in the population or cohort who are participating. Table V-1 shows the comparative participation rates for cohorts of physicians defined by breaking down a number of nominal characteristics used as physician descriptors. Eta squared statistics also were calculated for each nominal variable in the series of cross-tabulation analyses with the physician participation status variable. The eta squared value provides a measure of the proportion of population variance in physician participation that is explained by the breakdown on a given nominal physician characteristic factor.

It can be seen from Table V-1 that generalists (general practice and family practice physicians) have the highest participation rate. Of the 3,370 general physicians represented in the data base, 92.6 percent are participating. As a group, surgical specialists have the lowest rate, with 81.9 percent of the represented 3,189 surgical specialists participating. The four broad specialty classes account for 1.9 percent

TABLE V-1. BLUE SHIELD PARTICIPATION, BY GENERAL PHYSICIAN CHARACTERISTICS

Variable/Breakdown	% Par.	N
Specialty Group:		
General Practice	92.6%	3,370
Medical Specialties	88.6%	2,733
Surgical Specialties	81.9%	3,189
Other Specialties	83.2%	535
Selected Specific Specialties:		
General Practice	93.5%	2,547
Family Practice	89.7%	823
General Surgery	88.3%	935
Internal Medicine	88.3%	1,414
Obstetrics-Gynecology	82.8%	646
Pediatrics	93.1%	360
Physician Degree:		
M.D.	86.6%	8.720
D.O.	94.9%	1,107
Board Certification:		
Yes	83.4%	4,155
No	90.5%	6,572
AMA or AOA Membership:		
Yes	87.9%	7,600
No	86.1%	2,227
Number of Physician Associates:		
None	86.8%	8,340
1-3	90.3%	649
4-14	95.3%	342
15 or more	90.5%	496
Medical Education:		
Pennsylvania Medical School	87.3%	6,720
Other U.S. Schools	86.5%	2,114
FMG	90.9%	993
Physician's Age Decile:		
(1) Age 35 or less	85.7%	----
(2) 36-40	85.6%	----
(3) 41-44	85.2%	----
(4) 45-48	86.0%	----
(5) 49-51	86.6%	----
(6) 52-55	87.8%	----
(7) 56-59	88.4%	----
(8) 60-63	90.2%	----
(9) 64-68	90.3%	----
(10) 69 or older	89.4%	----

of the variance in participation status.

Among the selected specific major specialties displayed in the table, the primary care specialties -- general practice, family practice, and pediatrics -- are seen to exhibit the highest participation rates, ranging from 89.7 percent to 93.5 percent. General surgeons and internists both have rates that are marginally higher than the overall population rate. Among all specialties, including those not explicitly shown in the table, the highest participation rates (in addition to those already shown for primary care physicians) are those for specialists in roentgenology-radiology (96.6 percent) and physical medicine-rehabilitation (96.5 percent). The lowest participation rates are for specialists in opthalmology (72.1 percent), plastic surgery (71.8 percent), gynecology (69.4 percent), and anesthesiology (63.2 percent). Specific specialty accounts for 4.1 percent of the variance in participation status.

Participation rates for M.D. and D.O. physicians are 86.6 percent and 94.9 percent, respectively. D.O. physicians, however, constitute only 11.3 percent of the physician population in the study. It may be noted that the high rate of participation for osteopaths is consistent with the fact that they are heavily concentrated in general practice, which also has a high rate of participation.

Results for factors commonly perceived as being associated with physician quality confirm the theoretically expected result of higher participation rates for lower quality physicians. The above discussion already has indicated that specialty credentials are associated with lower participation. Board certification credentials similarly are associated with lower participation; boarded and non-boarded physicians have

respective participation rates of 83.4 percent and 90.5 percent. FMG physicians, who are generally regarded as being of lower quality, have a higher-than-average participation rate of 90.9 percent. FMGs, incidentally, tend to be specialists; they are not concentrated in general practice. Thus, the high participation for FMGs cannot be explained by any association of FMGs with the high-participation general practice cohort. Even though these presumed quality-related effects are working in the theoretically correct direction, they appear to have only weak influence. Board certification accounts for 1.1 percent of the variation in participation; and the three-way breakdown by source of medical education accounts for a nearly negligible 0.1 percent.

There is comparatively little difference in participation rates between physicians who are, and those who are not, members of their national professional associations (AMA or AOA). The eta squared for this factor is negligible.

Physicians practicing in association with other physicians have higher participation, particularly those involved with medium-sized groups (4 to 14 associates). All three of the non-solo cohorts have participation rates exceeding 90 percent, with a high of 95.3 percent for the medium-group cohort. This factor accounts for only 0.3 percent of the participation variance, however.

The distribution by physicians' age deciles shows a very clear tendency for participation to be higher among older physicians, and lower among younger physicians. The youngest 10 percent of physicians have an 85.7 percent participation rate; and the oldest deciles have rates in the neighborhood of 90 percent. The increasing progression in participation

rate from the youngest decile to the oldest is almost perfectly monotonic, and supports the theory suggested in Section II.A.2. In spite of the apparent orderliness of the relation between physician's age and participation status, the age breakdown explains only a modest 2.8 percent of the variation in participation.

B. ANALYSIS BY PRACTICE CHARACTERISTICS

For further analysis by physicians' practice characteristics, group means on the practice characteristic variables outlined in Section III.B.3 were calculated for participating and nonparticipating physician cohorts. ANOVA was used to determine whether differences in group means on a given variable were significant, and to determine the extent to which variance in each of the descriptor variables may be explained by the separation of the physician population into participating and nonparticipating components.

Two different sets of variables are used in describing a physician's practice characteristics: (1) a group of nine variables describing only the Blue Shield component of the practice; and (2) a group of eight variables describing some key characteristics of the physician's overall practice, encompassing the Blue Shield and Medicare components in aggregate. ANOVA results for each of these sets of variables are presented below.

1. Blue Shield Practice Characteristics

Table V-2 displays the group means of nine key variables used to

describe a physician's Blue Shield practice, for participating and nonparticipating physicians, respectively. The difference in means for annual services per Blue Shield patient is not statistically significant. On the variables for number of patients seen and percent UCR, the difference is significant at the .05 level. All other variables are significant at the .001 level or better. The following is a summary of observations that may be made from the results shown in this table:

(a) Nonparticipating physicians see more Blue Shield patients than participating physicians do. It is suggested that a relatively large Blue Shield patient roster provides no particular incentive for a physician to participate.

(b) The nonparticipating physician also provides a larger volume of services for Blue Shield subscribers than the participating physician does. Again, the physician is not particularly motivated to participate with Blue Shield simply by virtue of delivering a relatively large number of services covered by Blue Shield.

(c) The average total annual billing for Blue Shield services is larger for nonparticipating physicians than for those who participate. Clearly, this is related to -- and perhaps follows from -- the preceding two points. A large dollar volume of services covered by Blue Shield provides no particular motivation to participate.

(d) Nonparticipating physicians have a smaller proportion of their billed charges allowed -- i.e., their fee cut-backs

TABLE V-2. BLUE SHIELD PRACTICE CHARACTERISTICS, BY BLUE SHIELD PARTICIPATION STATUS

	Mean Value of Characteristic for:		
	Participating Physicians	Nonparticipating Physicians	Eta Squared
Number of Different Blue Shield Patients Seen	125.7	139.2	.0004
Annual Number of Blue Shield Services	448	526	.0012
Total Annual Blue Shield Billings	$16,825	$24,007	.0007
Blue Shield Allowed/Billed Charge Ratio	.789	.763	.0043
Mean Charge per Blue Shield Service	$50.96	$74.66	.0094
Mean Annual Services per Blue Shield Patient	3.36	3.19	.0004
Mean Annual Billing per Blue Shield Patient	$108.89	$145.73	.0106
Percent Blue Shield Services UCR	66.2%	67.9%	.0007
Blue Shield Relative Price Index	95.6	100.1	.0031

are proportionately larger than those of participating physicians. This conforms to the popular theory that larger cut-backs may contribute a disincentive to participation.

(e) In the context of Blue Shield practice, the physician who delivers relatively higher-valued services is less likely to be participating; and conversely, the participating physician delivers services that on the average are lower-valued.

(f) The data indicate a slightly greater numerical intensity of services per Blue shield subscriber for participating physicians. The difference, however, is not statistically significant. The conclusion must be that there is no essential difference between participating and nonparticipating physicians with respect to intensity of services for patients covered by Blue Shield.

(g) The mean annual billing per Blue Shield patient is larger for nonparticipating physicians than for participating physicians. This is consistent with, and undoubtedly follows from, points (a), (b), (c), and (e), above.

(h) Nonparticipating physicians have a slightly larger proportion of their services for Blue Shield patients covered under UCR. The difference is statistically significant, but not as strongly significant as for most other variables.

(i) The nonparticipating physician tends to have higher prices

than the participating physician for services covered by Blue Shield.

All of these factors have almost negligible percentages of their variance explained by the difference between participation or nonparticipation in Blue Shield. The greatest proportion of variance explained is for the annual billing per patient variable, and in this case it is only 1.1 percent. For all other variables in this list, it is less -- usually much less -- than one percent.

The differences highlighted in Table V-2 suggest that large Blue Shield volumes, however measured, do not motivate participation. Results from the factors in this list give little or no insight into what does motivate participation. There is an indication that larger relative cut-backs from billed to allowed charges tend to discourage participation. All of the factors in this list appear to have only weak effects, in any case.

2. Overall Practice Characteristics

The group means for eight key variables used to describe a physician's overall practice are displayed in Table V-3. All of the factors in this list are statistically significant. The variable for aggregate annual number of services is somewhat less significant than the others, but still is easily significant at the .05 level. The following effects may be observed or inferred from the results shown in this table:

TABLE V-3. OVERALL PRACTICE CHARACTERISTICS, BY BLUE SHIELD PARTICIPATION STATUS

	Mean Value of Characteristic for:		
	Participating Physicians	Nonparticipating Physicians	Eta Squared
Total Number of Different Patients Seen	242.5	273.3	.0011
Aggregate Annual Number of Services	1,357	1,227	.0006
Aggregate Total Annual Billings	$30,141	$39,261	.0054
Aggregate Allowed/Billed Charge Ratio	.833	.809	.0065
Aggregate Mean Charge per Service	$35.46	$49.50	.0065
Aggregate Mean Annual Services per Patient	6.51	5.32	.0058
Aggregate Mean Annual Billing per Patient	$121.40	$140.22	.0039
Aggregate Price Index	97.8	104.5	.0067

(a) A larger overall patient roster is associated with nonparticipation.

(b) A larger overall volume of services is associated with participating status.

(c) Larger aggregate annual dollar volume in billings is associated with nonparticipation.

(d) Nonparticipating physicians have a relatively smaller proportiion of billed charges allowed. It can be inferred from these data that, on the average, nonparticipating physicians are experiencing fee cut-backs relative to their billed charges that are approximately 14 percent larger than those experienced by participating physicians.

(e) Nonparticipating physicians tend to deal in higher-valued services than participating physicians.

(f) Participating physicians have a greater intensity of services per Blue Shield subscriber than nonparticipating physicians do.

(g) Nonparticipating physicians have somewhat larger annual billings per Blue Shield patient than participating physicians do.

(h) Nonparticipating physicians have higher overall price levels--approximately seven percent higher, on the average.

All of these are very weak factors. None of them has as much as one percent of variance accounted for.

The directional effects are mixed. It would appear that participating physicians have a greater volume of services and intensity of services per patient, but that nonparticipating physicians have larger patient volumes and dollar volumes in their overall practice. The nonparticipating physician also appears as a higher priced physician, dealing in higher-valued services. Relatively larger fee cut-backs seem to have a negative impact on participation. Again, however, it must be cautioned that the effects are weak.

C. ANALYSIS BY CHARACTERISTICS OF PRACTICE LOCALE

Practice locales are identified at the county level. Rates of physician participation in Blue Shield exhibit extensive variation by county. They range from a low of 64.4 percent in York County to a high of 100 percent participation in some sparsely populated counties in the mountainous and wooded center and northern tier of the state. Philadelphia County is the median, at 91.9 percent participation. The first and third quartile points are at 84.4 percent and 95.8 percent, respectively. Thus one-fourth of the counties are in a range running from 64.4 percent to 84.4 percent participation; one-fourth run from 84.4 percent to 91.9 percent; one-fourth from 91.9 percent to 95.8 percent; and the top one-fourth from 95.8 percent to 100 percent. There are eight SMSA counties in the first (lowest participation) quartile; eleven SMSA counties in the second quartile; three in the third quartile; and five in the fourth (highest participation) quartile. From this, there would appear to be a tendency for better participation rates in the less

populous, rural counties. Allegheny County (Pittsburgh), incidentally, is in the lowest quartile, with a participation rate of 83.2 percent. Overall, 3.7 percent of the variation in participation status is accounted for by county.

The remainder of this section entertains an examination of specific locality (county) variables that may be hypothesized to have some relation to physicians' participation responses. These variables were outlined earlier, in Section III.B.4, and are the same as those used in the immediately preceding section for an examination of the Medicare assignment response to practice locality factors. In brief, there are three subclasses of variables: (1) general demographic and socioeconomic factors; (2) selected factors relating to the local medical service economy -- essentially, cost and supply variables; and (3) factors describing health care insurance and subsidization in the local medical marketplace. Continuing the analytic strategy employed for other segments of this study, the group means of these variables are calculated for participating and nonparticipating physician cohorts. ANOVA is used to determine whether the group means are significantly different, and to determine the extent to which variance in each locality variable is explained by the participating-nonparticipating breakdown.

1. General Demographic and Socioeconomic Factors

Table V-4 displays the group means for all of the locality variables. The variables in the first block at the top of this table are the demographic and socioeconomic factors. All of these factors are statistically significant. Effects that may be associated with each

TABLE V-4. COMPARATIVE CHARACTERISTICS OF PHYSICIANS' PRACTICE LOCALES (COUNTY LEVEL), BY BLUE SHIELD PARTICIPATION STATUS

	Mean Value of Characteristic for: Participating Physicians	Nonparticipating Physicians	Eta Squared
General Demographic/Socioeconomic:			
Population density	4,144	2,965	.0048
Per capita income	$3,162	$3,243	.0028
Median years education	11.64	11.75	.0036
Percent college graduates	9.00%	9.62%	.0029
Percent laborers in workforce	4.78%	4.61%	.0026
Percent workforce unemployed	5.70%	5.43%	.0053
Pct. families below poverty level	7.90%	7.20%	.0064
Percent voted conservative	47.06%	49.25%	.0052
Consumer price index	116.4	116.3	.0000
Medical Service Economy:			
Relative price index for physicians' Blue Shield services	101.6	100.1	.0017
Mean monthly office payroll	$4,804	$4,820	.0000
Mean monthly pay per employee	$1,307	#1,309	.0000
Number of general hospital beds	4,724	4,142	.0016
Hospital beds per 100,000	483.5	457.1	.0022
No. direct patient care physicians	991	942	.0004
Number of primary care physicians	447	397	.0017
DPC physicians per 100,000	113.59	118.13	.0015
PC physicians per 100,000	50.64	50.85	.0000
Insurance and Subsidization:			
Blue Shield enrollment	560,953	511,988	.0008
Blue Shield penetration	54.38%	55.19%	.0001
Pct. physicians Blue Shield par.	82.83%	80.24%	.0188
Blue Shield payments ($ millions)	$16.762	$16.005	.0003
Pct. Medicare line items assigned	48.6%	44.8%	.0084
Medicare allowed charges ($ mil.)	$27.806	$23.761	.0027
Per cap. state med. exp.	$69.47	$60.76	.0056

variable, relative to Blue Shield participation, are summarized below:

(a) There is a tendency toward greater participation in localities with greater population density. Thinking of population density as a demand factor, the theoretical expectation would be for higher population density to generate more demand and more opportunity for the physician in the private unassigned and nonparticipating market. The expected upshot would be lower participation, which is not the result obtained.

(b) Nonparticipation is associated with slightly higher per capita income.

(c) Nonparticipation is associated with slightly higher levels of educational attainment for the population base. There is very little variation in this factor.

(d) Nonparticipation also is associated with higher population achievement in higher education -- i.e, where there are more college graduates, there is less participation.

(e) Where there are proportionately more laborers in the workforce -- i.e., a relatively lower grade workforce -- there is more participation.

(f) Participation tends to be higher where there is more unemployment.

(g) Participation tends to be higher where there are relatively more families below the poverty level.

(h) There is less participation at places where there is a

relatively greater conservative orientation in political attitudes and behavior.

(i) Cost of living apparently has no impact upon participation decisions.

All of these factors have very weak effects. If anything may be suggested, it is that there may be at least a weak tendency for more participation in areas that are somewhat more urban, have a politically liberal orientation, and are relatively downgrade in social and economic terms. Participation tends to be higher when there is relatively more poverty and unemployment, possibly suggesting a favorable physician response to population need.

2. Medical Service Economy

The group means for these factors appear in the middle block of Table V-4. The factors for number of direct patient care (DPC) physicians and for primary care (PC) physician supply relative to population are not significant; all others are. The data indicate or suggest the following:

(a) The relative community price level for services covered by Blue Shield has very little bearing upon the participation decision.

(b) There is negligible, or nearly negligible, difference in office wage costs between places where participation is high and places where participation is low. The office wage factor, as measured by either of the two such factors

in this list, apparently has no bearing on the participation decision.

(c) Participation is higher where there is greater hospital bed supply, whether measured in absolute terms or relative to the population base.

(d) There is no significant difference in number of DPC physicians between places where there is more assignment and places where there is less assignment.

(e) There appears to be a greater concentration of participation at places where there are greater absolute numbers of PC physicians.

(f) There tends to be less participation at places where DPC physician supply relative to population is greater.

(g) The supply of PC physicians to population is not significant.

All of these factors appear to be extremely weak as determinants of the participation decision. To the extent that factors in this set may have any effect at all, participation can be seen to be higher where there are more hospital beds available in the community. The effects of physician supply are mixed and confusing.

3. Health Care Insurance and Subsidization Factors

In economic terms, the variables in this group are essentially demand variables. Their group means are displayed in the lower block of Table V-4. The factors for Blue Shield enrollment, percentage of Blue

Shield penetration in the population, and Blue Shield payment volumes into the locality are not significant. The remaining four factors show significant differences between group means. Apparent effects associated with these factors are summarized below:

(a) Blue Shield enrollment and relative Blue Shield penetration operate in opposite directions, but neither is statistically significant. These factors probably should be ignored as determinants of the participation decision.

(b) The results suggest that the individual physician's inclination to participate may be higher at places where there is greater participation among the physician's professional colleagues in the local community.

(c) The difference in group means for total dollar volume of Blue Shield payments in the local community is not statistically significant. This factor thus apparently has no bearing on the participation decision and should be ignored.

(d) Participation is higher in localities where the overall community rate of Medicare assignment acceptance is greater. It is not clear whether this is coincidental or causal. If causal, it also is not clear whether Medicare assignment response drives the Blue Shield participation response, or vice versa.

(e) There is more participation at places where total Medicare allowed charges are higher.

(f) There is more participation at places where per capita expenditures by the state government for medical programs are higher.

The factor for percentage of physicians in the locality who participate in Blue Shield has 1.9 percent of variance explained. While this does not make it a particularly strong factor, it does emerge as the strongest factor in a generally weak group. All other factors have extremely small or negligible proportions of variance explained.

As somewhat of a surprise, it seems clear that these results do not support the notion that physicians are more prone to participate in localities where there are relatively large numbers of people covered by Blue Shield. In fact, the factors representing Blue Shield presence in the local market emerge appearing rather markedly meaningless in the participation decision. It does appear that the individual physician's participation decision may be influenced by larger scale Blue Shield participation and Medicare assignment by other physicians in the locality. This may very well be an effect more influenced by professional politics and personal psychological response than by economic considerations. It also appears, however, that participation tends to be higher at places where private insurance and government are putting more money into the local economy for purposes related to health care.

VI. SUMMARY AND DISCUSSION OF RESULTS

This study has undertaken a thorough examination of Blue Shield participation and Medicare assignment in the state of Pennsylvania. Analytical phases of the work have sought to identify and examine factors saliently related to physicians' Blue Shield participation and Medicare assignment decisions.

Overall, from the extensive and representative physician sample used as a base for this study, it was estimated that Pennsylvania physicians on the average take assignment on 37.7 percent of their Medicare line items, representing 45.1 percent of their billed charges under the Medicare program. The distribution of physicians with respect to their Medicare assignment rates tends toward a bipolar response. Most physicians either consistently accept assignment or consistently decline assignment. Relatively few are in the middle of the assignment response distribution, where physician response to the assignment option can be characterized as most ambiguous and uncertain.

For Blue Shield programs, the study results estimated 87.5 percent of physicians to be participating with Blue Shield in the state of Pennsylvania. This is somewhat higher than would be found by reference to the PBS physician masterfile, which over the past several years has indicated physician participation rates in the neighborhood of 80 percent. A great many of the physicians listed in the company masterfile rarely or never submit claims, however, and the 87.5 percent participation rate found in the study probably is a reasonably good estimate for physicians actually submitting Blue Shield claims with some regularity.

The major part of the study effort was devoted to determining patterns of participation and assignment, to differentiating the characteristics of those who do and do not participate or take assignment, and to developing insights into factors influencing physicians' assignment and participation decisions. The results of this effort reveal strikingly different physician response and factor association patterns for the Blue Shield participation decision, as compared to the Medicare assignment decision.

In terms of general physician characteristics, it was found that specialists have Blue Shield participation rates that are lower than those of general practitioners; but in the Medicare program, the result is precisely the opposite. In the Medicare market, specialists' assignment rates are higher than those of general practitioners. Theoretically, one would expect to find the result observed in the Blue Shield program. This is based on the argument that specialist credentials are perceived as an indicator of quality; and that the quality of services offered by a physician acts as a demand variable, with higher quality increasing demand in the open market and correspondingly giving the physician more opportunity and motivation to serve that market, foregoing the assigned/participating market. Results obtained by others on this point have been somewhat mixed, but have tended on the whole to conform with the theory.

With board certification credentials being similarly viewed as an indicator of quality, the same argument would lead to an expectation of lower participation and assignment rates for board certified physicians. This was the observed result for Blue Shield participation; but again,

the opposite result was observed for Medicare assignment in Pennsylvania. Other researchers who have evaluated this factor have rather uniformly found the theoretically expected result -- i.e., lower participation and assignment rates for board certified physicians.

Diametrically conflicting results also were obtained in the relation of the physician's age to assignment and participation. The results for Blue Shield participation showed a very orderly and well defined relationship, with participation increasing as the physician's age increases. Medicare assignment rate, on the other hand, was shown to decrease as the physician's age increases, with the relationship in this instance being equally orderly and well defined. Theoretical implications associated with the physician's age are somewhat unclear, depending upon the specific assumptions one makes concerning the concomitants of age and experience. Paringer (1980) found Medicare assignment to decrease with increasing physician age.

An area of agreement in study results was on the effects of FMG status. FMGs were found to have higher Blue Shield participation and higher Medicare assignment rates. This is consistent both with theory and with previous findings by others.

Another area in which there was at least partial agreement was on the effect of the number of physician associates with whom a physician is involved in his practice. Physicians in medium to large size groups were found to have greater Blue Shield participation and greater rates of Medicare assignment. The results were mixed, however, on the effects of being associated with only a small number of other physicians. Physicians practicing with one to three physician associates have the lowest Blue

Shield participation, but have a relatively high rate of Medicare assignment.

In looking at some key factors used to characterize a physician's practice, substantial differences again were found. Larger patient rosters are associated with higher Medicare assignment, but lower Blue Shield participation. Larger annual dollar volume is associated with higher Medicare assignment and lower Blue Shield participation. Physicians who deal in higher-valued services and physicians whose relative price levels are higher also have higher Medicare assignment, but lower Blue Shield participation. Larger relative cut-backs from billed to allowed charge were found to diminish Blue Shield participation, but not to reduce Medicare assignment. One area of agreement was in the annual total volume of services delivered and the intensity of services per patient. Increases in either of these factors were associated with increases in both Blue Shield participation and Medicare assignment. A further difference, however, was in the apparent relative strength of the effects identified. The strength of the effect upon Medicare assignment was quite strong for some factors, but all of the observed effects upon Blue Shield participation were substantially weaker.

The effects of practice locality characteristics were much more uniform than the disparate, and often opposing, effects described above for general physician characteristics and physician practice characteristics. Among the general demographic and socioeconomic factors, higher population density, a more liberal political orientation, higher levels of poverty and unemployment, and other relatively downgrade social and economic indicators all were found to exert a positive (increasing)

effect upon both Blue Shield participation and Medicare assignment. A slight difference was found in that localities with a high cost-of-living are associated with higher Medicare assignment rates, whereas Blue Shield participation does not appear to respond to area cost of living differences. The observed effects upon Medicare assignment were relatively weak, but for Blue Shield participation they were even weaker, often nearly negligible.

Blue Shield participation and Medicare assignment rate responses were in agreement for price, cost, and supply factors used in characterizing the medical services economy in a practice locality. Increases in hospital bed supply, and in the number of primary care physicians in a locality were associated both with greater assignment and with greater participation. Both Blue Shield participation and Medicare assignment failed to exhibit any clear relationship to other physician supply variables. There also was agreement in that office wage factors had little or no effect upon either Blue Shield participation or Medicare assignment. There was slight disagreement on the effects of generally higher price levels for medical services in an area. Medicare assignment showed an upward response to generally higher medical services prices, but Blue Shield participation showed no response. Again, the Medicare assignment effects were weak, and the Blue Shield participation effects were almost negligible.

Finally, there also was general agreement on the effects of health care insurance and subsidization factors. These effects can be summarized in the generalization that assignment and participation tend to be higher in areas where there are higher volumes of health insurance payment

dollars and higher levels of government expenditure for medical programs. There is a curious area of disagreement in one specific component of this effect, however. A greater Blue Shield presence in the market -- whether measured in terms of absolute subscriber enrollment counts, relative penetration as a percentage of local population, or benefit payment dollars -- is associated with higher levels of Medicare assignment; but a greater Blue Shield presence in a local market does not generate any increase in physician participation with Blue Shield.

Some of the observed results tentatively suggest that individual physicians exhibit a greater inclination to participate in areas where there is a generally higher level of physician participation with Blue Shield, and that they also exhibit an inclination to higher levels of assignment acceptance in areas where there is generally higher physician assignment acceptance. It may be that this is merely an illusion arising from a tautological relationship between the locality and individual physician variables describing assignment/participation in the data base; or it may validly be reflecting a disposition of individual physicians to "follow the pack" in their assignment and participation decisions.

There also are indications of behavioral crossover between physicians' Blue Shield participation decisions and Medicare assignment decisions. This is evidenced by results suggesting that physicians who participate with Blue Shield have a predisposition to also accept assignment on Medicare. Blue Shield participating physicians have an average Medicare assignment rate that is more than twice as great as the assignment rate for nonparticipating physicians (40.4 percent, compared to 18.8 percent).

Summarizing the empirical findings from this study in a slightly different way, a profile of the typical physician who consistently accepts Medicare assignment would depict him as being a young, board certified specialist. This typical consistently-assigning physician would have a high volume practice, with a large overall patient roster. The types of services he delivers would be relatively high-valued, and his fees would tend to be higher than those of other physicians doing the same mix of procedures. He would deliver a high volume of services, and he would have a relatively high level of intensity of services delivered per patient. All this would contribute to a large dollar volume in his practice.

For Blue Shield, the profile with respect to general physician characteristics and practice characteristics would be almost perfectly reversed. The profile given above for the typical physician who consistently accepts assignment on Medicare would also serve almost perfectly as a profile of the typical physician who does not participate with Blue Shield. The only exceptions would be that high volumes of services and high intensity of services per patient on the Blue Shield side would tend more to be associated with the participating physician. Otherwise, the above profile describes the representative nonparticipating doctor.

While the Medicare assigning doctor and the Blue Shield participating doctor are almost perfect mirror images of one another, they tend to have the same kind of practice locality profile. The participating or assignment-taking physician typically will be found in a locality having a relatively high population density, a relatively liberal political orientation, somewhat higher than average proportions of unemployed

workers and families under the poverty level, and other generally downward-tending social and economic characteristics. In addition, the locality will have a large hospital bed supply and a large number of primary care physicians. There will be a relatively high volume of money entering the local medical services economy from health insurance and government program sources.

In an overview by broad classes of factors, it appears that Medicare assignment is determined more by basic individual physician characteristics and practice characteristics than by characteristics of practice locale. Practice characteristics describing size and volume of practice, as well as the relative value of services delivered, appear to have particularly strong influence upon the assignment decision. The physician's specialty alone is a strong determinant, accounting for 14.5 percent of the variance in assignment rates. The county level locale accounts overall for a relatively much smaller 7.9 percent of variance, with specific characteristic factors for locality on the whole showing much weaker influence than the specific factors used to characterize practice.

The potential explanatory relationships in general appear weaker for Blue Shield participation than for Medicare assignment. As in the case of Medicare assignment, a greater amount of variance is explained by specialty than by practice locale (county), but for Blue Shield participation they explain a mere 4.1 percent and 3.7 percent, respectively. The explanatory power of factors describing individual practice characteristics in relation to Blue Shield participation appears very weak.

In summary assessment, there appears to be at least some measure of systematic and rational explanation for physicians' Medicare assignment decisions and behavioral responses, even if contrary to the presumed theories in some ways. On the other hand, there appears to be no strong or compelling rational explanation for Blue Shield participation or nonparticipation. Perhaps this may be because Blue Shield participation decision processes are more essentially political and psychological than rationally economic in nature.

How can we explain the very remarkable difference in physicians' behavioral responses to the Blue Shield participation decision on the one hand, and to the Medicare assignment decision on the other, in relation to essentially identical situational factors in some cases? The answer may lie in the fundamental difference between an all-or-nothing commitment in the Blue Shield participation decision, and the far more free and flexible claim-by-claim option for Medicare assignment. The effects and relationships observed for Blue Shield participation, although weak, tend to be qualitatively and directionally consonent with the outcomes predicted by economic theory. Perhaps the claim-by-claim assignment option under Medicare produces operational and practical impacts upon physicians that are much more like those which would occur in an open competitive market than like those to be expected from a full-commitment participating market. Alternatively (or perhaps additionally), it may be conjectured that if Blue Shield participation decisions are essentially political and/or psychological, such considerations might override the normal effects of rational economic factors. These remain good questions for further research.

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